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BULLETIN NO. 15. (Dairy No. 6.)

U. S. DEPARTMENT OF AGRICULTURE.

BUREAU OF ANIMAL INDUSTRY.

THE CHEESE INDUSTRY

OF

THE STATE OF NEW YORK.

BY

B. D. GILBERT,

Special Expert Agent, Dairy Division.

Under the direction of

Dr. D. E. SALMON,

Chief of the Bureau of Animal Industry.

1862 1889

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
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LETTER OF TRANSMITTAL.

U. S. Department of Agriculture,
Bureau of Animal Industry,
Washington, D. C., October 17, 1896.

Sir: I have the honor to transmit herewith a report upon the Cheese Industry of the State of New York, prepared under the supervision of Henry E. Alvord, chief of the Dairy Division, by Benjamin D. Gilbert, special expert agent of that division. Mr. Gilbert is secretary of the New York State Dairymen's Association, and has been for years secretary of the Utica Board of Trade and dairy editor of the Utica Herald. The report includes a chapter describing in detail the most approved method of making full-cream factory cheese, by G. Merry, also special agent of the Dairy Division.

It is respectfully recommended that the two reports be combined and published as a bulletin of this Bureau.

Very respectfully,
D. E. Salmon,
Chief Bureau of Animal Industry.

Hon. J. Sterling Morton,
Secretary.

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THE CHEESE INDUSTRY OF THE STATE OF NEW YORK.

By B. D. GILBERT,
Secretary New York State Dairymen's Association.

HISTORY OF CHEESE MAKING IN NEW YORK STATE.

LOCALITIES WHERE FIRST UNDERTAKEN.

The art of cheese making in this country dates back a hundred years or more from the present time, but the science of cheese making, or its manufacture on scientific principles, is not 50 years old, and is far from being fully understood in this year of grace 1896. Thirty years ago Mr. X. A. Willard, who was then the chief expositor of our cheese industry in the public journals and pamphlet literature of the day, stated in an address before the American Dairymen's Association that he remembered to have seen the persons who first began cheese dairying in Herkimer County, N. Y., and to have eaten of the product of their manufacture. This would carry cheese making in Herkimer County back to the early part of this century; but the following statement indicates that this art was practiced at an earlier date in a county farther south. In a volume entitled Memoirs of the Board of Agriculture of the State of New York for the year 1826, there is a paper on "The manufacture of butter and cheese," by S. DeWitt, of Albany. In it he says:

> When I first came to Albany more than thirty years ago, I found a Mr. Hudson, an Englishman, settled as a farmer near Cherry Valley, celebrated for his excellent cheese; afterwards a Mr. Tunnicliff, also an Englishman, on the Susquehannah, equally celebrated in the same way. I have had cheese from both which would not suffer in comparison with the best from England of the same age.

This takes us back to 1795 or 1796, and locates cheese making at that time in what is now Otsego County. It gives the honor of beginning the art in the State of New York to native-born Englishmen, and shifts the scene from Herkimer County to Otsego County.

But while it is probably true that Herkimer was not the pioneer county in making cheese in this State, it is certainly true that she soon forged ahead of all other districts, and maintained her lead with great preeminence down to the introduction of the factory system in 1851. That cheese was made there early in this century is attested by a

Mr. Osborn, who spoke at a meeting of the State Agricultural Society in 1854. He related how Daniel Day came from Uxbridge, Mass., about the year 1808, and settled in the town of Newport, "a wild, woody region, and a hard country for new settlers." Here he purchased 200 acres of land and stocked it with ten or twelve cows and some sheep. The old man had formerly been connected with a manufacturing establishment "down East," and twice a year he would take off a load of wool, butter, and cheese and bring back a load of factory goods in exchange. In 1813 Mr. Osborn's father purchased the Day farm, and continued to carry on the same business. His description shows how crude were the methods in vogue:

> There was the cheese press, a simple bench 8 or 10 feet in length, with a frame at one end for the lever, and guides for this lever at the other end, and then another lever over these guides the other way to raise the weight on the end of the pry. The cost of this press was about $1. All the other utensils of the dairy were about after the same order. There was a constant strife between the cheese hoop and the churn as to which should have the lion's share of the cream. During the summer season when there was some risk in making butter, much of the cream went into the cheese, and as cold weather approached it was pretty evenly divided; but late in the fall cheese was sometimes made of the pure sky blue, the classical name of which was "white oak." Whether it acquired this name from the resemblance of its color to the wood or from its toughness is uncertain.

So it seems that the same tactics were practiced eighty years ago, in the infancy of the business, as are current now, and probably will be as long as cheese shall be made.

It is a curious fact that some of the earliest things published in this country on the subject of cheese making were descriptions of several varieties of cheese made on the Continent of Europe which have never yet been produced here with success. In the same memoirs of the State board of agriculture quoted above, but in the volume for 1823, there is a description of a Parmesan cheese dairy, together with directions for making Edam, Swiss, and Brie cheese, thus representing the make of four different countries on the Continent. By that time there must have been a considerable amount of cheese made after the English style in the interior of the State, for Mr. De Witt asked in 1826, "Why is it that while tons of this article (cheese) are brought to our market (Albany) it is so extremely difficult to find any which a man of taste would tolerate on his table?" The fact is that the Dutch of the Mohawk Valley, whose ancestors might have brought over some knowledge of making the kinds of cheese known in Holland, seem to have entirely lost the art. Mr. Aaron Petrie, of Little Falls, stated in a letter to the State Agricultural Society, in 1841, that "about 1820 the dairy business began to attract attention in the northern part of Herkimer County, particularly cheese making. All who adopted it flourished at once, and it is another instance of the difference of policy pursued by the descendants and settlers of New England and their Mohawk neighbors that the benefits of dairying were confined to the former for at least ten years, and indeed until the sterility of the once fertile land of the Mohawk compelled the latter to adopt it."

METHODS PRACTICED IN EARLY TIMES.

In those early days cheese was made in a more or less haphazard fashion and on a comparatively moderate scale, since it was all made in private dairies and principally by the women of the household. The amount of milk was necessarily limited, the dairies ranging from 10 or 12 to 35 or 40 cows, so that there was no difficulty in working it in large tubs.

Heating the milk.—There was difficulty, however, in applying heat, and this was one of the causes which rendered the product uneven in quality, although made by the most practiced hand. Various methods were used for this purpose. One writer gives the following description:

> Milk is put into a brass pan and made scalding hot by placing the pan on a furnace or in a vessel of hot water; then one-half of it is poured into the cheese tub among the cold milk and the rest into a pan in which the cream had been put. The cream and the hot milk being intimately incorporated, the whole is poured into the cheese tub, which by this time has received great addition, if not the whole of the morning's milk warm from the cows.

Another method is described as follows:

> A brass kettle nearly filled with water is then suspended in the vat, reaching within 4 inches of the bottom, into which is inserted a lead pipe attached to a patent steamer; the mass is then warmed to 85°, being stirred gently with the hand during the time of warming. The heat is then increased fast enough to bring the whole mass up to 100° F. in forty minutes.

The degree of heat was in many cases simply guessed at from contact of the hand with the milk. As late as 1842 a maker who took a prize at the State fair with his cheese, in describing his method of manufacture, said:

> The milk when ready for the rennet should be some degrees less than milk warm (*as I never have used a thermometer* I can not say *how* many).

The same man says that his cheese are pressed "by means of a weight on one end of a lever resting on the cheese follower as a fulcrum near the other end." This was the single-lever press. The double lever has already been described.

Rennets.—Another cause of poor cheese was the slovenly and inadequate preparation of the rennets. There is more literature on this subject in the publications of that period than on any other topic of the dairy. What kind of rennets to use, how to feed and when to slaughter the calf, how to clean and dry the rennets, what color a good rennet should have, how to preserve and keep it for the proper length of time, are all subjects that are discussed elaborately. As late as 1866, Mr. Weeks, the secretary of the American Dairymen's Association, stated that "a substitute for rennet that shall be cleanly and of uniform strength is what we most need in cheese making."

Lack of apparatus.—In those days there was no patent apparatus to lessen the work of the cheese maker. Success or failure depended wholly on the judgment of the individual, and that was formed by a long period of apprenticeship and by the experience gained through years of hard and faithful work. Women as a rule made the cheese; they did even more than that, they helped milk the cows in the open air, often out in the rain or snow, and they also took care of the milk. The fact that American cheese not only met with a large sale at home, but by the year 1847 was exported to the amount of 15,637,600 pounds, speaks well for the skill of our foremothers in manufacturing this product of the dairy.

Measuring the milk.—As late as 1842 the amount of milk used in cheese making was measured by gallons instead of pounds. For instance, one writer produces the statistics of his dairy, which show that in September 674 gallons of milk made 733 pounds of cheese. From October 1 to October 9, inclusive, 523 gallons made 643 pounds, while from October 10 to October 19, inclusive, 574 gallons made 683 pounds. This showed that it took less milk to make a pound of cheese as the season progressed, but it was impossible to establish a ratio. When the manufacture of cheese assumed larger proportions, especially after the introduction of the factory system, it was found very inconvenient to have one standard for measuring milk and another for measuring its product. Evidently the cheese and butter could not be measured by quarts and gallons, so in order to unify the standards it was determined to measure the milk by pounds. This was rendered absolutely necessary by the requirements for handling milk at the factories. If measured by the quart or gallon it would take the whole day to credit the different patrons with the amount of milk delivered by each. But the moment that milk began to be measured in pounds, the whole matter was simplified, and the ratio between milk and its products, butter and cheese, could be established without difficulty.

Marketing.—The manner in which cheese was put up for transportation should also be noticed. Originally the cheese had no protection or covering; they were laid carefully in the bottom of a wagon covered with straw, in order to carry them to market or to peddle them around the country. At this time, it should be noted, not even a bandage was put around the cheese. In the next improvement long, rough casks were made, in which from four to six cheeses were placed, one on top of the other, so that a number could be handled at a time without much injury to the cheese. In this shape cheese was sent to the New York market for many years, and it is still the manner in which Swiss cheese is shipped, both in this country and abroad. Finally, the plan of boxing each cheese separately was adopted, and about the same time our makers began to use bandages around the cheese. The first evidence of this which appears in the market reports is found in December, 1841. Previous to that time, the stock had been quoted as "Cheese Am."

(American). But that winter a new quotation appeared. Cheese "in bxs." was quoted at 7 @ 8c., while cheese "in casks" brought only 6 @ 7c. The modern idea that neatness in putting up any article of food is an element in the successful sale of that article found an immediate practical illustration in the sale of cheese. Probably the cheese put up in boxes was no better in quality than the cheese that was shipped in casks; but the more tidy appearance of the goods that were boxed, and the protection afforded by the boxes, caused them to sell for a cent a pound more than the old style as soon as they appeared in market.

About the year 1830 the production of cheese had become sufficiently large to engage the attention of special buyers. The product was not then sold as it is now, at twenty to forty days from the hoop. The whole season's production was kept until fall and then marketed in the bulk, just as butter used to be and still is, in some of the remoter districts. From 1810 to 1830, which was the introductory period of manufacture, the product was peddled around the country by the farmers themselves. One might imagine that cheese made and sold under these circumstances would not only not meet the requirements of our modern tastes, but would hardly be a palatable article of food for less critical and more uncultivated tastes. But it is a fact that the cheese makers of that early day throve remarkably well, so much so that their numbers increased rapidly; and this furnishes good evidence that their product was liked and appreciated by the public of that day, however much it might be criticised by a consumer of the present time.

As soon as the idea gained a foothold in the minds of traders that there was money to be made in handling this product of the dairy, they began to make a regular business of buying cheese. Starting out early in the fall, they carefully canvassed the entire region where this industry was carried on, contracting for the whole season's make of as many dairies as they could buy at figures which promised them a profit. Whatever stock was sent to tide water went by canal, and a moderate proportion of the cheese contracted for by buyers during the twenty years between 1820 and 1840 was sold to exporters.

EARLY CHEESE MAKING IN NEW ENGLAND.

How long ago cheese was made in New England it is not easy to discover. We know that in 1802, soon after the inauguration of Thomas Jefferson, a delegation went from the town of Cheshire, Mass., to Washington, D. C., taking with them, on a wagon drawn by six horses, a mammoth cheese for presentation to the President.[1] The committee also carried with them an address from the inhabitants of the town with the inscription, "The greatest cheese in America for the greatest man in America." As early as 1819, at the first exhibition of the Worcester, Mass., society, there was one premium given on cheese and it was awarded to Messrs. John and David Hunter, of North Braintree. This was the banner town in cheese making for many years afterwards. In the report of the society for 1852 it was stated that at all the exhibitions held there for thirty-three years a majority of the premiums on cheese had been bestowed on citizens of North Braintree. It was also stated that "our farmers had an opportunity of examining specimens of cheese from New York, and we may hope for similar favors from other States." In 1851 the report of the Hampshire society contained a flattering statement concerning New York dairymen. It said:

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[1] It is a curious fact, in line with President Jefferson's big cheese, that in the early days of the factory system Mr. Willard spoke of large cheeses weighing 700 to 1,000 pounds as being frequently made, and as bringing 17 cents per pound when cheese of the ordinary size would sell for only 10 to 12 cents.

> May the day soon arrive when our dairies shall become to old Massachusetts all that the dairies of New York are to the Empire State. The average annual product in 1846 of the dairies of Herkimer County ranged from 500 to 650 pounds of cheese per cow. A Mr. Rottier, of Jefferson County, in 1849, produced from 26 cows an average of from 125 to 150 pounds of butter and from 300 to 400 pounds of cheese per cow. When the farmers of the Connecticut Valley *will* to have such products, with the blessing of God they will come.[1]

This shows that, as far back as the forties, New York State was leading the rest of the country in cheese making.

EARLY CHEESE MAKING IN PENNSYLVANIA.

In Pennsylvania also there was cheese made for family use at an early date. MacMaster, the historian of the people of the United States, informs us that in Lancaster and other towns in the neighborhood of Philadelphia many of the settlers were Germans who possessed great thrift and industry.

> With the exception of fresh meat, everything the German ate grew upon his own land. His food was chiefly pork and rye, onions and sauerkraut, milk and cheese, and turnips and Indian corn. The good wife and her daughters worked the loom, made the cheese and butter, and when the harvest came toiled with the sickle in the field.

This was in the year 1800.

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[1] The figures, however, are exaggerated and misleading, as may be seen by analyzing them. For example, 150 pounds of butter in those days would require 3,750 pounds of milk, and 300 pounds of cheese would take 3,000 pounds of milk, making a total yield of 6,750 pounds of milk from each animal in a dairy of 26 cows. There are comparatively few dairies even now that will give such an average yield as that. As for the "annual average product" of Herkimer County dairies ranging from 500 to 650 pounds of cheese in 1850, such a statement is hardly to be credited. In the report of the New York State Agricultural Society for 1844, Mr. Alonzo L. Fish published an account of the management of his dairy farm in Herkimer County. He stated that in 1842 the average product of cheese from his dairy of 25 cows was 714 pounds, while in 1843 the average was 650 pounds, one-quarter of the animals being heifers. Possibly this was in the mind of the writer who gave the above-quoted estimate for Herkimer County.

STATISTICS OF CHEESE PRODUCTION.

The statistics of any business form the touchstone by which to judge of its prosperity or the reverse. There are no statistics of the cheese business in this country which can be relied upon previous to the United States census of 1840. It is stated in Transactions of New York State Agricultural Society for 1851 that "the first exports (of cheese) were in 1789, but they were very inconsiderable and were not of an extent to command even the attention of Congress till 1820." Prior to the last-named date the statistics of exports and imports were reported very imperfectly, while no attempt had been made to gather the statistics of production. By the act of Congress under which the census of 1820 was taken the name and nature of certain articles manufactured, their market value, and some other details were given; but cheese and butter were not included, and the figures were all so poorly collated and so unsatisfactory that in the census of 1830 no attempt was made to secure industrial statistics.

PRODUCTION OF NEW YORK STATE COMPARED WITH THAT OF THE WHOLE UNITED STATES.

In 1840 the value of dairy products of all kinds was taken together and without record of quantities; the value for the whole United States was $33,787,008, New York State producing $10,496,021 of this amount. When the State census was taken in 1845 it was estimated that one-third of the 999,400 cows employed in the dairy throughout the State were devoted to the manufacture of cheese, giving 36,744,976 pounds in all, or about 110 pounds per cow. This was probably not far from correct, although if there was an error it lay in the direction of under-estimating. We have the actual figures giving the tons of cheese moved on all the State canals in 1846 and 1847. In the first-named year 15,417 tons of New York State cheese were transported, besides 3,616 tons from other States and Canada. In 1847 the New York State cheese carried amounted to 15,983 tons, along with 4,056 tons from other States and Canada. If we turn the long tons of State cheese into pounds, we find that in 1846 there were 34,534,080 pounds, and in 1847 there were 35,801,920 pounds, showing an increase of 1,267,840 pounds during the year. Undoubtedly there was a considerable amount of cheese sold at markets where it could be delivered by team, and this, added to the quantity transported by canal, would indicate that the census estimate for 1845 was pretty nearly correct, although probably somewhat smaller than the facts would warrant.

The national census of 1850 credited New York State with producing 49,741,413 pounds of cheese, but the State census of 1855 gave only 38,944,240 pounds, a decrease of 10,797,173 pounds. This would be difficult to explain if it stood alone, especially as the number of milch cows in 1850 was only 931,324, while in 1855 the number of cows had risen to 1,123,634, a difference of 192,310 in favor of the latter year. A partial explanation seems to be that there was a heavy increase in the production of butter, the price rendering it more profitable to convert the milk into butter than into cheese. The production of butter in 1850 was 79,766,094 pounds, while in 1855 it had increased to 90,293,073 pounds, an improvement of about 12½ per cent. If we convert the butter product of 1850 and that of 1855 into their equivalents in cheese and add to each the cheese product of those two years separately, it will be found that the total for 1855 exceeds the total for 1850 by only 15,500,000 pounds. Divide this by the excess in number of cows in 1855 and it gives a product of only 80 pounds of cheese per cow, or just one-half the estimated production of cheese per cow in 1850. The probability is that there was some error in the State census of 1855, inasmuch as the census of 1860 showed a production of 48,548,288 pounds, or within 1,200,000 pounds of the product in 1850. Presumably the production of cheese during the decade that extended from 1845 to 1855 was fairly even and steady, while that of butter was considerably increased, along with the increase in the number of cows.

Down to this time the introduction of the factory system seems to have made no great difference in the quantity of cheese made either in New York or in the whole United States. There was comparatively little change either in the absolute or the relative amounts. The figures are as follows:

Year.	United States.	New York.
	Pounds.	*Pounds.*
1850	105, 535, 893	49, 741, 413
1860	103, 663, 927	48, 548, 289

A decrease of 1,871,966 pounds for the whole country is less than the decrease of 1,193,124 pounds for the State alone; but both amounts are small and not especially significant where such large totals are concerned. When we reach the State census of 1865 we find that a long stride forward has been taken. The figures for that year were 72,195,337 pounds, showing an increase in the State of 23,647,048 pounds, or 48½ per cent. This was the result of the wonderful extension of the factory system. During the period from 1851 to 1860 this system was in an experimental stage. Even in 1861 Mr. Willard spoke of the system as having been but lately introduced, and said:

> A brief statement has been made as to this plan of cheese manufacture because it is comparatively new, and because it may possibly prove suggestive, not only to persons already engaged in dairying, but as offering a feasible plan for those unacquainted with the art in districts where it is proposed to introduce dairy farming.

And in 1871 Hiram Walker said:

> It is but nine years since the first cheese factory was erected in Oswego County.

It evidently took about twelve or thirteen years for dairymen to make up their minds whether or not the factory system was advantageous and was going to prove a success.

The next five years showed an increase of 28,580,675 pounds, bringing the total up to 100,776,012 pounds, an improvement of very nearly 40 per cent. This was under the national census, and we are therefore able to compare the yield of this State with that of the United States. It will make the matter somewhat clearer to put the figures in tabular form.

Year.	United States.	New York.
	Pounds.	*Pounds.*
1870	162, 927, 382	100, 776, 012
1860	103, 663, 927	48, 548, 289
Excess of 1870	59, 263, 455	52, 227, 723

This is a most remarkable statement, inasmuch as it shows that while New York had increased her production more than 52,000,000 pounds, or considerably over 100 per cent, during this decade, all the rest of the United States had only increased by the comparatively small amount of 7,035,732 pounds. Probably it will be said that the civil war prevented the extension of cheese manufacture in other States, but it is not easy to discern why the war should have had more effect in other Northern States than it did in New York. The more probable explanation seems to be that New York, being the State in which the factory system originated, appreciated more readily the importance of the system and was quick to take advantage of the enormous prices paid for cheese during the years 1863 to 1870.

The State census of 1875, the last one taken, again showed a small decrease of 2,050,840 pounds. This is only 2 per cent of the product of 1870, while the increase in the production of butter amounted to 3 per cent, thus showing where and how the milk had been used. The national census of 1880, however, gave an increase of cheese made in this State amounting to 30,438,542 pounds, or a little less than 31 per cent, and bringing the total up to 129,163,714 pounds, the highest total production of cheese ever reached in the State according to a United States census. That year New York made 56½ per cent of all the cheese produced in the United States. The figures for 1890 were not so favorable, being only 124,086,524 pounds, a shrinkage of 5,077,190 pounds, or 4 per cent, while the production of the whole country was 13,604,033 pounds greater than in 1880. There seems to be no doubt that the manufacture of cheese was then really on the wane in this State and that it has continued to decrease since that time.

FARM DAIRY CHEESE.

In the case of cheese made on dairy farms this reduction is especially noticeable. The census figures show this very plainly, as follows:

Farm dairy cheese made in the State of New York in—

	Pounds.
1875	7, 778, 413
1880	8, 362, 590
1890	4, 324, 028

There was an increase in this class of goods between 1875 and 1880 of nearly 6 per cent, but in the decade between 1880 and 1890 the shrinkage was almost 50 per cent. This is easily accounted for by the fact that many factories which ordinarily made large sizes found it to their advantage to change their style in the fall and manufacture small sizes, such as are usually made in private dairies. As a rule dealers prefer to handle factory-made cheese, especially when produced in a well-known establishment, where the stock is likely to prove more uniform in its character. This and the growing distaste of the women of the farm to continue the hard labor involved in cheese making have vastly diminished the amount of farm dairy goods and bid fair to nearly eliminate them from the market.

PRODUCTION IN NEW YORK IN 1895.

Inasmuch as no State census of New York was taken in 1895, it is impossible to give absolute figures for the cheese production of that year. An attempt has been made, however, to get at these statistics as accurately as was feasible without resorting to actual census methods. The transactions of the different boards of trade in the State for the season of 1895 have been obtained, as well as the purchases of many individual buyers in other parts of the country. From a number of the large combinations in the western part of the State also the statistics of their manufacture have been received, and in addition to these an estimate on the unreported and unknown sales to home buyers and to dealers in those parts of the State which have no public market, has been made upon principles which will be explained hereafter. In making up this estimate one great fact had to be steadily borne in mind. The drought of the summer of 1895 was the longest and most severe of any that has occurred in this State in a quarter of a century, which means since boards of trade were established in the interior of the country. In the central and northern parts of the State the shrinkage in the output of cheese was fully 20 per cent; in the western part it ranged from 25 to 33 per cent. Early in June the poor condition of grass began to show itself, and it was attributed to a combination of causes. Prominent among these were the long drought of the previous season, which killed the roots of the grass and seriously thinned the meadows, and the heavy frosts which occurred both early and late in the spring of 1895, the latest occurring the morning of May 22. From the middle of June to the middle of July there was no rain and the hay crop was fully one-quarter short. There were occasional showers after that, but cows kept right on shrinking in their milk yield, which was no larger the 1st of August than it usually is on the 1st of October. In the western part of the State the drought was so severe that in some instances boughs of trees were lopped off that cattle might feed on the leaves. Some dairymen were even prosecuted at law because they actually starved their cattle. They had nothing on the farm to feed to the cows, and could not or would not buy sufficient food to keep them from suffering.

In order to show upon what foundation the estimate of the production of 1895 is based, the figures obtained from different sources are here collated:

Boards and markets.	Number of boxes.
Utica Board of Trade	218.545
Little Falls Board of Trade	150.207
Watertown Board of Trade	98,845
St. Lawrence County Board of Trade	85 000
Fulton Board of Trade	49,656
Ogdensburg Board of Trade, about	32,000
Gouverneur Board of Trade	21.730
Marketed at Cuba, Allegany County	86,250
Marketed at Norwich, Chenango County	82 300
Marketed at Lowville, Lewis County, about	85,386
Seven combinations in Cattaraugus County	80.081
Total	990,000

These figures are as nearly correct as it is practicable to present. They represent approximately the production of the counties of Oneida, Herkimer, Chenango, parts of Madison and Otsego, Montgomery, Jefferson, St. Lawrence, Lewis, Oswego, part of Onondaga, Allegany, and parts of Cattaraugus and Chautauqua.

For the benefit of those who are not familiar with the cheese trade it may be well to state that "boxes" of cheese vary in size and weight, ranging from 34 pounds for a small sized home-trade cheese up to 75 pounds for large-sized export cheese. It has always been the custom at the Utica Board of Trade to estimate the average weight of boxes throughout a season at 60 pounds, and the same estimate was adopted by Hon. B. F. Van Valkenburgh, assistant dairy commissioner of this State, in making out his reports for publication. A similar result was arrived at by the secretary of the Watertown board, who wrote to a number of dealers and organizations for their views and published the answers. A large majority agreed that 60 pounds was a fair average weight for the cheese produced in New York. In the ordinary method of reporting the markets the number of boxes is given, and not the number of pounds. There is so much difference in the weights of the separate cheese that it would be wholly impracticable to figure out the exact amount in pounds. Therefore, in writing on the subject of the cheese trade in this State, it is customary to speak of the number of boxes instead of the number of pounds.

The only census from which it is possible to obtain the total production of cheese by counties is that of 1865. In that year the total product was 72,195,337 pounds. The same fourteen counties represented above gave 60,860,778 pounds, which was 84 per cent of the whole amount. Although this was thirty years ago, the relative proportion of cheese made in these counties is still as large as it was in 1865, or even somewhat larger. In the year 1892 the commissioner of agriculture of New York directed the assistants of his department to make a full enumeration of the cheese and butter factories in the State, including their production during that year. The same work was done again in 1894, and the figures for the last-named year showed a marked falling off during the two years that had elapsed. The statistics of 1892 placed the total production in New York for that year at 131,148,310 pounds; those of 1894 placed it at 115,760,345 pounds, showing a decrease of nearly 12 per cent. At the same time the number of cheese factories in operation had decreased from 1,156 to 1,032, but the number of creameries, or establishments where both cheese and butter are made, increased from 213 to 315.

In the enumeration of 1892 the fourteen counties for which partial figures of the past season have already been given produced 113,533,012 pounds of cheese. This is 86½ per cent of the whole, or 2½ per cent more than it was found to be in the census of 1865, which shows that these counties had made a slight gain in the relative proportion of their manufacture of cheese. The proportion of these counties to the whole State in 1894 was 86 per cent, a difference of only one-half of 1 per cent, and as this was the year just previous to the one we are attempting to estimate, it seems best to accept this proportion as the basis of an estimate for 1895.

It has been shown that in 1895 portions of fourteen counties produced 990,000 boxes of cheese. If this amount forms 86 per cent of the whole, by adding the remaining 14 per cent, or 171,730 boxes, a total of 1,161,730 boxes is reached, equivalent to 69,703,800 pounds. This represents what may be called the known quantity. A sufficient amount must be added to represent the unknown quantity included in the partial estimates of some of the counties, the quiet purchases of home traders, and the consumption of producers themselves. The shrinkage of trade at the Utica board since the agricultural census of 1892 has been about 13 per cent; that of Little Falls is over 27 per cent. The receipts of cheese in New York City in 1892 were 1,999,029 boxes; in 1895 they were only 1,259,990 boxes, showing a decrease of 37 per cent. The receipts of 1894 were 1,613,385 boxes, and this shows a decrease in one year of 22 per cent. These few figures demonstrate the difficulty of forming any accurate judgment of the yield based upon incomplete returns. At the same time it is believed that if the total already named be considered as representing two-thirds of the yield of the State last year, it will come very near the correct figures, which would stand as follows:

	Pounds.
Two-thirds (closely estimated)	69, 703, 800
One-third (approximated)	34, 851, 900
Total	104, 555, 700

In confirmation of this, it has been seen that the decrease in production, as shown by the census of the State commissioner, amounted to about 6 per cent per year from 1892 to 1894. In 1895, however, the drought was much more severe than in the two years previous, and the shrinkage must have been still more pronounced. If we allow 8 per cent decrease last year instead of 6, the total decrease since 1892 would be 20 per cent, and 20 per cent off 131,148,310 pounds brings it down to 104,918,648 pounds, which substantially agrees with the estimate given above.

STATISTICS OF EXPORTS AND IMPORTS OF CHEESE.

EXPORTS OF AMERICAN CHEESE.

In speaking of the exports of cheese, it has been thought best to use the figures for the whole United States rather than for the State of New York only, for two reasons: First, because the exports from New York City form such a large proportion of the total exports from this country; and, secondly, because the totals make the tale they have to tell more forcible and striking. To show the proportion of New York exports to those of the United States, the figures are herewith given for five years, from 1890 to 1894. They are taken from Assistant State Commissioner Van Valkenburgh's report, in which each year ends with the last of October.

Exports of American cheese, 1890–1894.

Year.	Exports.	
	From New York alone.	From all ports in the United States.
	Pounds.	*Pounds.*
1890	70, 208, 270	91, 014, 571
1891	61, 299, 205	77, 148, 794
1892	67, 432, 651	81, 589, 361
1893	53, 293, 060	67, 925, 712
1894	50, 375, 760	65, 054, 452

Taking these five years together, the proportion of the exports from New York to those of the whole country is a little over 79 per cent, and when we go back to the early years of exportation the proportion of New York is still greater. It seems evident, therefore, that whatever deductions may be drawn from the figures for the whole United States will also prove true of the exports from New York alone.

The statistics of our exports both of cheese and butter are much more satisfactory and available than those of production. Beginning with 1830, we have the exports for each year down to the present time, so that comparisons can easily be made. During the ten years from 1821 to 1830, inclusive, the entire volume of cheese exports was only 7,914,198 pounds. For the next ten years, to 1840, they were 8,247,795 pounds, an increase for the decade of only 333,597 pounds. But during the next decade there was an enormous increase, the business running up to 90,610,348 pounds, the exports of 1849 alone amounting to 17,430,000 pounds, or double the entire business of the 1830–1840 decade. It was a strange freak of trade, however, that the exports from 1850 to 1860 should fall off about 13 per cent and aggregate only 78,533,783 pounds.

In 1853 they ran down as low as 3,763,932 pounds, which was the lowest point they had touched in twenty years. And what makes it still more singular is the fact that this was during the first ten years after the introduction of the factory system. It is true that the system was on its trial during that period and made exceedingly slow progress, so much so that in 1860 only about a score of factories were in existence. Then, however, they increased so rapidly that in 1862 Mr. Willard enumerated 34 factories in Oneida County alone, and stated that Herkimer, Cortland, Jefferson, Lewis, and Otsego each possessed its own quota of factories.

In the year 1860 the exports rose from 7,103,323 pounds the year before to 15,515,799 pounds, and the next season to 32,361,428 pounds, and so on, with an irregular but pretty constant increase, until 1870–71, when the amount had risen to 63,698,867 pounds. The total for that decade was 446,512,816 pounds, an advance over the previous ten years of about 550 per cent. As a very large proportion of these exports went to Great Britain, it is reasonable that we should look for some cause for this enormous increase outside of the mere increase of manufacture in our own country.

Cause of increase.—It is believed that this may be found in Great Britain herself. In 1843 there was a duty imposed on cheese imported into that country of 5s. per hundredweight. In 1853 this duty was reduced to 2s. 6d. per hundredweight, and in 1859 the duty was abolished altogether. There is a striking coincidence, to say the least, between this fact and the doubling up of our own cheese exports in 1860, together with their continuous increase for the next ten years. By 1874–1875 our foreign trade in cheese had reached the hundred millions mark, and only once down to 1883 did it fall below that mark, and that occurred in 1875–76 when the exports receded 3,330,000 pounds. The decade from 1871 to 1880 came near reaching a thousand millions, the exact figures reported being 999,924,409 pounds. The exports of the years 1884 and 1885 exceeded a hundred millions each, but never since then have they reached that point. The figures are herewith presented in tabular form, and are for the commercial years as known to the cheese trade, including twelve months ending on the 30th of April of the years named.

Exports American cheese, 1881–1896.

Year.	Cheese exported.	Year.	Cheese exported.
	Pounds.		*Pounds.*
1881	147,995,614	1889	84,999,828
1882	127,989,782	1890	95,376,053
1883	99,220,467	1891	82,133,876
1884	112,869,575	1892	82,100,221
1885	111,992,990	1893	81,350,923
1886	91,877,235	1894	73,852,134
1887	81,255,994	1895	60,448,421
1888	88,008,458	1896	33,977,040

The flood tide of our exports occurred in the year 1880–81. Once before, in the year 1878–79, they rose to 141,654,474 pounds, but in no other year did they reach 128,000,000. The really serious decline began in 1885–86, when the exports fell off 20,000,000 pounds, and amounted to slightly less than 92,000,000. The rally in 1889–90 came partly from a light make of cheese in England and a very heavy one in this country, and consequently lower prices than had been experienced since the season of 1879. For three years after that the exports remained about on the basis of those of 1887, but in 1894 they declined 7,500,000 pounds, and in 1895 they met with another decline of 13,400,000 pounds. The year just past, however, is far worse than any year since 1866, when the exports were 34,052,678 pounds, and it compares very closely with that.

Included in the amount of these exports are the cheese which go over the northern border of New York in the summer time to Montreal and thence to England. Ogdensburg is the principal point from which these exports are made, although the statistics of that office include all the stock which is shipped at Clayton and Alexandria Bay, as these two ports are in the Ogdensburg district. There are also small shipments made from Cape Vincent. The figures are as follows for the season of 1895:

Exports cheese via Canada.

Shipments from—	Pounds.	Value.
Ogdensburg	4,350,384	$320,136
Cape Vincent	63,824	4,808
Total *a*	4,414,208	324,944

a In 1885 the writer obtained the figures of exports from these same ports. They amounted to 2,403,857 pounds for that year, showing that in ten years they have increased nearly 90 per cent.

This is all northern New York stock of the best quality, a large portion of it uncolored. It represents less than 5 per cent of the cheese manufactured in the State last year, but it also represents about 13 per cent, or one-eighth, of the entire exports of the country during the year 1895. A large proportion of the cheese made in northern New York is white; it is also acknowledged by dealers to be as fine as any produced in this country. For both of these reasons it is sought after by Canadian buyers, and the statement is made that considerable of it is branded "Canadian cheese" before being shipped to the old country. Unfortunately, this is considered a compliment to the stock, which no doubt sells better for being so branded; otherwise the brand would not be put upon it. At certain seasons of the year there is a lively competition for these goods between Montreal and New York, but when the market is active Montreal is liable to get the lion's share, on account of lower freight rates in that direction, which enable Montreal buyers to pay better prices than New York buyers can.

The causes of decrease.—The exports of cheese from this country are therefore down to a point which had been reached thirty-four years ago, when the factory system was comparatively new and there were only about 400 factories in this State. There must certainly be some strong reasons for such a remarkable decline in the business within ten or twelve years. During that period the exports of Canadian cheese have increased almost as rapidly as ours have decreased, and the relative positions of the two countries have been almost exactly reversed. It may be well to see what was said about our cheese in 1866. Mr. X. A. Willard, who had been sent to England the year before by the American Dairymen's Association, to investigate the methods of manufacture there, said in the convention of 1866:

> I have given them (English makers) the credit of producing a limited quantity of cheese of the finest type that has ever been reached by any manufacturer; but the quantity is comparatively small, and when the whole bulk is considered, there is nothing like the richness and uniformity of that from our factories.

Three years later, at the convention of 1869, Mr. John M. Webb, a New York dealer and exporter, related some of his experience abroad. He said:

> During my visit to London last October, I went through a carefully selected stock of over 10,000 boxes of New York State cheese, with one of the largest and most experienced cheese factors in the south of England. The inspection was close and critical. When it was concluded, I asked two questions. The first was, "How do these cheeses compare with the English make of the current season?" Said this most competent authority, "The season has been so unfavorable that I don't think I could get returns of equal quality in all the south of England." I then asked, "How does the stock we have been looking through compare with the best English cheese of an average season?" The reply was, "They are just as good, and I did not think it possible to get together so many fine American cheeses."

Mr. Webb afterwards said that later in the season this cheese developed a lack of keeping quality, which seems to have been always one of the most serious faults with American cheese. These quotations, however, show that twenty-five or thirty years ago our cheese met many of the requirements of English dealers and consumers, and took the lead of all imported cheese in the English markets.

What has taken place since that time? The cheese trade of Canada can hardly be said to have made a beginning thirty years ago, while that of the United States was easily ten times as large as our neighbor's. In the year ending May 1, 1896, the proportion of exports is about 5 for Canada to 2 for the United States. Evidently there must be something radically wrong with the manufacture of our cheese to bring about such a change as this. It has been suggested that, on account of the frozen meats brought from Australia and South America to England and sold at lower prices than ever before, the consumption of cheese has declined in the latter country. There is undoubtedly some force in this argument, for we find that while the Canadian exports of cheese in 1894 were 1,726,058 boxes, which was the highest point they have ever attained, in 1895 they were 10,000 boxes less, thus showing a slight falling off there also. For the last three or four years the imports from Australasia have been a comparatively steady quantity, and any small increase of these imports would do very little toward making up for the 400,000 boxes shortage in the imports from the United States in the year ending April 30, 1896.

It seems evident therefore that the consumption of cheese in England has materially decreased within a short period of time. The same thing has happened with pork. A recent English writer says:

> It is generally considered that one of the chief causes of the low price of pork is the establishment in the country districts of shops for the sale of imported beef and mutton, which has been retailed at 3d. to 6d. per pound. A leg of 2-year-old wether mutton at 6d. per pound has been too great a temptation to countrymen, and the consumption of pork is not half as large as within recent years in the country districts for bacon-curing purposes.

Exactly the same thing may be said of cheese. The English countryman prefers to eat mutton rather than cheese, the price of both being the same. And that accounts in some measure at least for the decrease of 400,000 and odd boxes of cheese which the English imports showed last year.

But this is not the only reason nor the most serious one. As has already been said, there is something radically wrong with our cheese itself—something which has been gradually developing for several years past, but the effect of which was not fully appreciated until last season. As long as ten or twelve years ago the manufacture of "filled cheese" was being carried on in a small way by people in the Western States, where there were no prohibitory laws against it. In fact the article was originally made in New York at least as early as the year 1880. Several patents were issued to cover the special processes by which the cheese was made, and down to 1884 a lucrative business was carried on by the few establishments which had adopted its manufacture. But in the year 1884 the New York legislature passed a series of restrictive dairy laws, and created a dairy commissioner with a staff of officials to see that the laws were enforced. The men who owned the patents, as well as those who had been using them, at once conformed to the statutes, being law-abiding citizens, and no filled cheese has been made in the State since that time. But a year or two later the process was taken up in Illinois and then in Wisconsin, and its manufacture has been carried on with increasing volume. The result has been exceedingly disastrous to the cheese trade of the whole country. In two directions the sale of filled cheese has done harm to our dairy interests. One of these was abroad, the other was in the Southern States. It may be advisable to speak of these separately.

The injury done to our foreign trade by this product of skim milk and some foreign oleaginous substance to take the place of butter fat is not a new thing. It extends back for a number of years, and its results appear to be cumulative. When filled cheese was first sent abroad, it was not recognized as such. It went along with other goods which were the genuine article, and as no statement was made in regard to it, the receiver naturally accepted it as full cream, or, at least, as a lightly skimmed cheese. So long as it was sold and eaten within a short period after its arrival, there was no suspicion of its genuineness. But after a while the stuff began to show its natural badness and to deteriorate very rapidly. Those who bought it lost money on it. This went on from season to season, and each year the English buyer became more and more suspicious of cheese from "The States." There was no guarantee of genuineness except the New York State brand, and not only did many of our State factorymen neglect to use this, but Western full creams could not be branded with it, while Western filled cheese often was branded with some inscription that was intended to convey the impression that the goods were not imitation, but genuine. This tended to discredit all cheese from this country, including that which carried the New York State brand. In the early winter of 1895 Wisconsin passed a prohibitive law in effect similar to that of New York. This removed her from the rank of counterfeiters, leaving Illinois to carry on the traffic alone. Canada had already seen her great opportunity and passed laws prohibiting the manufacture or sale not only of filled cheese, but of skimmed cheese also, and, in fact, of everything except full cream cheese, the pure product of cows' milk. This law has spiked our guns during the past year and rendered us comparatively helpless. Without it we might have divided the 400,000 boxes, of which the English imports are short. If our cheese had been all right, there can be little doubt that the decrease of consumption in England would have made a serious falling off in the Canadian exports as well as in our own. As it is, the English know Canadian cheese to be genuine, while all the United States product is more or less suspected; therefore they buy the Canadian in preference, and leave us to bear alone, practically, the whole of their decreased consumption.

IMPORTS OF FOREIGN CHEESE.

An analysis of the importations of cheese into this country may be of interest to the cheese maker. Previous to the year 1885 the importations of cheese, butter, and milk were all pooled together and only the total value of the whole was reported each year. But in 1885 the custom-house authorities began to report each of these articles by itself, and it will aid the reader in making comparisons to have the table of cheese importations before his eyes.

Imports of cheese, 1885–1895.

Year.	Cheese.	Value.	Year.	Cheese.	Value.
	Pounds.			*Pounds.*	
1885	6, 247, 560	$964, 587	1891	8, 863, 640	$1, 358, 752
1886	6, 309, 124	855, 570	1892	8, 305, 288	1, 238, 166
1887	6, 592, 192	874, 261	1893	10, 195, 924	1, 425, 927
1888	8, 750, 185	1, 214, 936	1894	8, 742, 851	1, 247, 198
1889	8, 207, 026	1, 135, 184	1895	10, 440, 863	1, 471, 091
1890	9, 263, 573	1, 295, 506			

It should be said that down to 1895 these figures represent the even year from January to January, but in 1895 they are the imports from July 1, 1894, to June 30, 1895, which represents the fiscal year. For practical purposes, however, it is about the same. It will be seen that our imports have increased 67 per cent in the eleven years enumerated above, while our exports during the same period have diminished in just about the same proportion. At an average price of 8½ cents for the cheese sent abroad the past year the value of our exports is only as much again as the money paid out for imports. Nearly a million and a half of dollars was paid to foreign countries for cheese delicacies, a portion of which might be made at home if our dairymen and cheese makers would only do their work in the right and proper way.

In order to understand the situation more clearly, a special analysis of the imports for the year 1895 will be found useful. The following table gives the countries from which cheese was received, the number of pounds from each, and the value of the same in dollars:

Amount and value of importation of cheese for the year 1895, by countries.

Country.	Quantity.	Value.
	Pounds.	
United Kingdom	125, 411	$24, 824
France	832, 940	139, 562
Germany	400, 710	52, 261
Italy	3, 048, 762	454, 651
Netherlands	929, 327	109, 589
Switzerland	4, 834, 961	657, 931
Other European countries	215, 236	25, 346
British North America	37, 664	5, 380
Other countries	15, 852	1, 547
Total	10, 440, 863	1, 471, 091

It will be seen at a glance that the importations from Switzerland and Italy comprise more than three-fourths of the whole amount, and that of the remainder the Netherlands contribute about 36 per cent and France about one-third. The cheese from France is principally Roquefort, Camembert, and Brie. Of these last two varieties we make a certain amount, but they do not compare favorably in quality with the foreign goods. The stock imported from the Netherlands is composed chiefly of Edams, although there are also a few Goudas. Some attempt has been made to produce Edams in Wisconsin, but it has not proved to be a success. So far as can be learned, there ought to be no serious obstacle to producing a fine quality of Edam in this country. There is a lucrative business awaiting the man who will resolutely set about making a choice article of Edam cheese in New York. It will require some capital and considerable patience, as the cheeses ought not to be marketed until they are three to five months old. But if they are made fine enough to sell for any such price as the foreign Edams bring their manufacture will pay a handsome profit. American sweitzer is made not only in New York, but in Ohio, Indiana, Michigan, Wisconsin, West Virginia, and on the Pacific Coast. The product of Wisconsin is decidedly preferred to that of the other States by dealers in New York City. At the same time it is far from being equal to the imported Swiss cheese, as is shown by the prices at which it sells. The foreign article was sold by importers in the early winter of 1896 at 19 to 20 cents, while the same parties jobbed American sweitzer at 12 to 13 cents. There could be no such difference as this if there was anything like a parity in the quality of the two. Nearly 5,000,000 pounds of imported Swiss cheese is used in this country. The quantity made in the Western States is uncertain, although it is probable that Wisconsin produces about 1,250,000 pounds. It is a liberal estimate to put this manufacture in New York at 300,000 pounds, and that of the other States at 950,000 pounds. This would place the entire make of Swiss cheese in this country at 2,500,000 pounds, which is about one-half of the amount imported. It shows that there is a wide margin here for the improvement and extension of manufacture of this class of goods also.

The importations from Italy consist of seven varieties, viz: Romano, Reggiano, Parmesan, Gorgonzola, Caccio Cavallo, Formaggio di Bra, and Canestrato. Of these, the Romano is most largely imported, while Parmesan and Reggiano come next. Of the other four varieties only small quantities of such are brought over, three of them belonging to a class which may properly be called noncivilized cheese. The Romano variety is made from the milk of buffaloes, of which animal there is a species bred in central Italy much smaller than our bison. Their milk contains hardly any butter fat, and there would seem to be no great hindrance to the production of Romano cheese in this country out of skimmed milk, providing the correct method of manufacture was followed and the requisite time given for curing. But it is not probable that Parmesan cheese could be produced here successfully, as even the Swiss, who have tried it on the southern slopes of the Alps, have not been able to succeed. It seems to be a product peculiar to the plains of the Po and to the soil and pasturage belonging to that region.

Reggiano, which is made of full cream, is a mild and wholly civilized cheese, but requires long age to perfect it, inasmuch as it is never eaten less than a year old, and from that up to four years old. Its shape is that of a small-sized flat cheese made for home trade; but its exterior is black, though smooth, being rubbed occasionally with a preparation of lampblack and linseed oil to keep away flies during the long process of curing.

FANCY CHEESE.

DIFFERENT VARIETIES MADE IN THE STATE OF NEW YORK.

In addition to the ordinary styles of cheddar and flat cheese there is a considerable amount of "fancy" cheese made in this State. This includes the different varieties of foreign cheese, together with soft cream cheese and what is known as "pineapple" cheese, which is a distinctly American variety. The principal varieties made here are as follows: Limburger, domestic Swiss, Münster, Brie, d'Isigny, Neufchâtel, Hand, Wiener, and Camembert. Limburger has been so successfully made in this country that the domestic article has practically superseded the foreign, and very little of the latter is now imported. One reason for this appears to be that Americans do not like the cheese as strong as foreigners want it. In this country it is put on the market and consumed when it is from 1 to 2 months old, at which age it has not acquired the very strong, rank flavor so much admired abroad. The Münster cheese is a milder and more solid form of the same class of goods. The Swiss cheese made in New York differs from the real Swiss in not having the gases so largely developed, and hence in being a more solid cheese and containing fewer and smaller holes. It is also marketed when only 3 to 4 months old, whereas the genuine Swiss cheese is kept in the curing house for eight or nine months, which allows it to develop a richer, more aromatic flavor. Here again, however, the American taste for a fresh and comparatively mild flavor in cheese is met by the domestic manufacturer. In the home-made Brie and d'Isigny this tendency is still more pronounced. Both of these varieties are sold at 2 to 4 weeks of age, when they are not much more than curd, and have hardly developed their distinctive qualities or have developed them in such a partial degree that they can hardly be classed as one thing or the other. The Hand Kase is a soft cheese, which needs to be marketed as soon as made, which is also the case with Wiener, Neufchâtel, and cream. Some of the domestic Camembert is said to be a fair substitute for the imported.

PRINCIPAL FACTORIES WHERE THEY ARE MADE.

There are three establishments for making fancy cheese in Orange County. The largest of these was established in 1873, and its principal business is in Neufchâtel and cream cheese, although it makes a little Fromage de Brie and d'Isigny. A Frenchman had come to the county and manufactured Neufchâtel some time before, but had not made a business success. The present proprietors bought out the interest of this pioneer and continued the enterprise. During the first year they used not more than 20 quarts of milk a day in the manufacture of the cheese, but gradually the business assumed larger proportions. Then a well-known New York firm sent for the senior proprietor and told him that they wanted for their trade a richer and more delicate cheese than anything to be found in the market and asked him if he could not devise something of that kind. After studying the subject for some time he produced the rich, soft, cream cheese which is now such a favorite among cheese lovers, and which has been so extensively copied and reproduced by other establishments. The origin of this variety of cheese should therefore be credited to Orange County and the establishment referred to. At first the Neufchâtel was packed in empty starch, raisin, or soap boxes, which could be bought cheaply from grocers. These held from 112 to 248 cakes of the cheese, which were at that time simply rolled in tissue manila paper and packed in the boxes, with straw to fill the interstices. At length it occurred to the makers that it would be much better to have boxes made of the exact size to hold a certain number of cakes; so boxes holding 200, 150, and 100 cakes were tried, and it was very soon found that those holding 100 were most in demand. Then others were made to contain 50 cakes, and finally only 25, and with each change the business showed an increase. Along with the change in boxing came other improvements, such as substituting white parchment paper for manila, and outside of this tin foil stamped with a trade-mark and the name of the cheese. The same results followed these improvements as when ordinary factory cheese were first put into single boxes instead of casks—the neater appearance of the goods largely increased their sale.

The cheeses of this firm are sold in all the large cities of this country, from Boston to New Orleans. They even go to the Pacific Coast, and, what is stranger still, there is a steady and increasing demand for them in the island of Cuba. The war in Cuba does not seem to have caused any diminution in the sale of cheese there. The firm continues to ship weekly an average of more than 100 cases to the island. Ordinarily in the Eastern States the cheese is consumed within a few days after being made, and when asked if it did not acquire a sharp taste after a long voyage by sea or overland, the originator said he had never eaten it in the tropics, but had tried it in Western Oregon, and had found it all right there.

This establishment is very complete, and may be taken as the type for this class of manufacture. About 200,000 feet of lumber is used annually, the wood being cut and put up in shooks about 100 miles away. A printing machine has recently been purchased for putting the imprint on the outside of the boxes, which has hitherto been done with a stencil plate. With this the printing will be done directly upon the wood. The manufacturing rooms occupy the entire basement of the large building, and are floored throughout with stone. A 75-horsepower boiler runs the machinery. All the utensils and cloths are cleansed by steam. The curd, after draining as much as it will in the sinks, is put under powerful presses in bags, about a dozen under each press, of which there are long rows through the middle of one end of the basement. Of course large quantities of extra cream are used to enrich the cream cheese, and this is obtained by three large separators. The milk is put into the separators warm and fresh, but as the cream runs out it drips over a range of pipes filled with brine, and even in the warmest weather when the cream reaches the cans into which it drips it is cooled down to 36° or 38° F. The large curing rooms for hot weather are also cooled with brine pipes. The skim milk is all carried by gravity to a tank outside the building, and from that is forced up to another tank on a hill 3,500 feet away. There it is used for feeding hogs, of which about 400 are kept continually in the pens. This is one of the profitable features of the establishment.

During the first winter this concern only used about 200 quarts of cream the whole season; now over 800 quarts of cream are used per diem. The total amount of milk used in the year 1895 was something over 3,250,000 quarts. Three millions of this was used in the manufacture of cheese, the rest in producing cream, which was sold in its natural condition. In round numbers, 6,000,000 pounds of milk was converted into cheese, the product of which would average 600,000 pounds of cheese. The low prices of Cheddar cheese in 1895 did not affect the price of soft cheeses to any considerable extent, nor does the season of the year affect them. From January to January they sell at the same prices. This system has its advantages and its disadvantages; for, should the New York price of milk average high, the manufacture of fancy cheese must be conducted at a loss, the milk being bought from the dairymen on the basis of prices at the New York city market.

The sale of fancy cheese is increasing rapidly, and the enormous falling off in our export of Cheddar cheese will, if it continues much longer, compel the factory men to enter upon some other branch of the business. While it is manifestly for the interest of this factory that the number of factories making soft cheese should continue to be limited, the proprietors can not help expressing the conviction that sooner or later our factory men will have to resort to the manufacture of a better article of Cheddar, or to a first-class butter, or to different varieties of cheese, in order to make a market for the milk.

Of the other two factories of a similar kind in Orange County, one makes only Brie and d'Isigny, and the other adds Camembert, Caprera Cream, Neufchâtel, Kümmel, Liederkranz, and Kappen cheese. The proprietors of both are native Swiss, and learned the art of cheese making in their own country. In the case of the older factory, its operators spent seventeen years in Normandy, France, where they perfected their knowledge of the Brie process. Coming to this country, they opened a factory for the production of foreign varieties of cheese, and for a time they made Camembert also, although recently they have given this up. They were the originators of the variety called "d'Isigny." When asked how they came to give it that name, they replied that, as Isigny butter was the best butter made in France, they desired to make their Fromage d'Isigny the best cheese in the United States. But as soon as the cheese began to acquire a reputation other makers imitated it and used the name, although it properly belonged to their manufacture only. At the World's Fair in Chicago their Brie, d'Isigny, and Camembert all took first prizes, and several of the leading hotels and most fashionable restaurants in New York City use their goods. The cheese is principally marketed in New York and Chicago. They hold their prices firm and do not change from year's end to year's end. They use in round numbers 1,160,000 pounds of milk yearly, which gives them a production of about 116,000 pounds of cheese.

Another factory is situated in the village of Monroe. This establishment is now managed by a Swiss maker, and produces a greater number of varieties of cheese than the other two factories. Its manufacture comprises Brie, d'Isigny, Camembert, Caprera Cream, Neufchâtel, Kümmel, Liederkranz, and Kappen cheese. More of the two varieties first named are made than of the others, and in the winter season the racks are well filled with stock, ranging from perfectly new to 3 and 4 weeks old. They handle about the same amount of milk as the factory described above and produce about the same quantity of cheese annually.

Another large establishment of the same character, and one of the largest in the United States, is located in Jefferson County. At this factory are made Brie, d'Isigny, Camembert, Neufchâtel, Square Cream, Wiener, Münster, Limburger, Stilton, and in the summer time some American. The variety that is made in largest quantity is d'Isigny, and Neufchâtel comes next. Their goods are marketed in all the large cities of the United States. Most of them are sold at 20 to 30 days of age, except the Cream and Neufchâtel, which are shipped fresh. The factory handles about 15,000,000 pounds of milk annually, which in round numbers amounts to 1,500,000 pounds of cheese. The business increases from year to year, and the low prices of Cheddar cheese last season seemed to make little if any difference in the prices of their goods. Their plant is furnished with all sorts of machinery for doing the work and with every device for saving time and doing away with manual labor. The company has in its employ men from different parts of Europe who make special kinds of cheese by the same processes that are used abroad.

Still another is located in Chenango County and does a large business. Its headquarters are in New York City, where it does a large importing business also. The staple varieties of their manufacture are Neufchâtel, Philadelphia Cream, Saratoga Cream, Brie, and d'Isigny, besides which they make some Münster, Hand, English, and State factory cheese in summer when there is a surplus of milk. The manager of their factory turns out besides cheese a large amount of butter, which is unsalted, uncolored, and is put up in prints for the New York market. During the year 1895 the company received 3,470,516 pounds of milk, from which they manufactured the following amounts of cheese:

	Boxes.
English Dairy cheese	4,230
Neufchâtel	28,789
Philadelphia Cream	10,625
Fromage de Brie	6,272
Fromage d'Isigny	10,927
Hand Kase	1,800
Münster	950

Averaging the cheese at 10 pounds to the hundredweight of milk, the total cheese made by this company would be 347,051 pounds. The name "Philadelphia Cream," for cheese, is secured to this establishment by copyright.

A cheese of peculiar size, shape, and appearance, and known as the Pineapple, is made in Wyoming County. This style originated with the family which still controls its manufacture. These cheeses are made in three sizes, viz, 2, 4, and 6 pounds, the larger size being put up four in a box, the others seven in a box. They are jobbed at $2.75 per box. Last year was about an average season for the business, but prices were a trifle lower than before, being somewhat affected by the decline in Cheddar cheese. These goods are marketed in all the large cities of the land. Sixteen per cent of extra cream is added to the milk from which the cheese is made, thus creating a rich and delicate product that finds favor with many consumers. The cheese will keep perfectly for two or three years; hence there is no danger of loss to jobbers or retailers who handle it. The season of manufacture is from the first of April to the middle of November. About 1,000,000 pounds of milk were used by this firm last year, which produced 100,000 pounds of cheese.

Still another establishment which manufactures small cheese and English Dairy cheese that go through a special process and are cured much longer than our ordinary stock before being sent to market, is located at Gilbertsville, Otsego County, N. Y. The firm owns a dozen factories, scattered through different towns in that county, and their manufacture consists principally of fancy small cheeses of different sizes. Last year the production was as follows:

Styles.	Quantity.
	Pounds.
English Dairy, 19 pounds each	354, 443
Table cheese, 4 pounds each	16, 000
Fancy uncolored:	
10 and 20 pounds each	82. 916
24 pounds each	246, 735
Total	700, 094

It takes the English Dairy cheese from five to six months to cure sufficiently to be put on the market. They are sold principally in New York, Boston, Philadelphia, and Baltimore. The Table cheese has to be cured about the same length of time. The smaller uncolored cheeses are ready for market in thirty days, and are made especially for New York customers. The larger uncolored fancy cheeses are made for the Boston market. These are made soft, and are ready for market at twenty days old. It is understood that a considerable proportion of the cheese which is sent to New York and Boston goes directly to private families, on orders, just as a good deal of the fancy butter made in private dairies is supplied to special customers. This is the most desirable trade to have, as it saves the commission of a middleman.

The total amount of fancy cheese annually manufactured by these seven establishments is about 3,500,000 pounds.

MANUFACTURE OF LIMBURGER, SWEITZER, AND MÜNSTER.

In addition to these special factories there is a considerable number of establishments in Oneida, Lewis, and Jefferson counties which manufacture Limburger, Swiss, Münster, and Stilton cheese exclusively. In the report of the New York State commissioner of agriculture for 1893, 57 of these factories are named, 2 of which, for the manufacture of Swiss cheese, are in Erie County. The total product of the 57 establishments in the year 1893 was 2,629,142 pounds, which was included in the sum total for that year already given, as was also the product of the other fancy cheese factories. Although there was very little diminution in the product of the latter last year, it is quite probable that the product of the Swiss and Limburger factories decreased last season in about the same ratio as that of the Cheddar factories, as they were subjected to the same climatic influences. The amount of Limburger produced is far in excess of all the other varieties put together, 40 factories making 2,003,070 pounds. There are, besides, 8 factories which made both Limburger and Swiss cheese, and these produced 181,256 pounds. The 6 factories that are devoted entirely to the production of Swiss cheese made 231,121 pounds. Five factories, which made Stilton and other fancy brands, produced 158,695 pounds, and the product of 2 factories in which only Münster is made was 55,000 pounds. Of course, the product of this whole business is small, being only a trifle over 2 per cent of the entire amount of cheese made in the State, or, counting in the other fancy cheese, about 6 per cent of the whole. There is, therefore, ample room for an increase in the production of fancy varieties, providing they are made sufficiently palatable to tempt the tastes of our own population. That must be the criterion for success. There are as yet no Edams made in this State, although, with the exception of Swiss and Italian cheese, the largest importation of any foreign variety consists of Edams. There is a clear field open for the maker who will produce this cheese of such a quality that it will compete with the importations from Holland. It is doubtful if Roquefort cheese can ever be successfully produced in this country, on account of the requirements for curing it, unless the time shall come when any variety may be reproduced by the introduction of the proper bacilli. Such a result seems to be the dream of the dairy bacteriologist of the present day.

While the amount of Brie cheese made in the State is comparatively large, it does not yet rival its French namesake in delicacy and palatability. Further improvement in its manufacture will doubtless create a greater demand and a wider market for it. Some of the Camembert made here is really good, but not yet equal to its foreign competitor. But for the production of any European variety with success, a special study must be made of our soil and grasses and of the conditions of our climate. Above all, our dairymen must learn to exercise the same care and neatness in the treatment of their cows and milk that is found in the Swiss and Dutch dairies. In the countries which produce those fine varieties of cheese the cow stable is often an integral portion of the house and is kept with the same scrupulous neatness. Of course it is not necessary that our dairymen should build the house as an attachment to the stable, or should put the manure pile in the front yard, as is commonly done in continental countries, but it is necessary that they should keep the stables free from manure and from bad odors, that they should give clear, pure water to the cows, and that the cows and their udders should be kept as free as possible from manure or dirt of any kind.

An expert opinion on the requisite dairy work.—A member of one of the largest cheese importing houses in New York, himself in early life a practical cheese maker in Switzerland, when asked his opinion as to the manufacture of foreign varieties in this country, said it would be of great value to our dairymen, not more on account of the money to be made by it than for the special care it would require to be given to the cattle and to the general work of the dairy in order to produce fine qualities of cheese. It would have a tendency to compel the dairyman to take more rational care of his cattle and their food. Certain weeds in the pastures are very detrimental to the manufacture of such cheese, and they ought to be grubbed out as they are in European countries. The cows also should receive more attention than is customary in America, to obtain the largest possible quantity of milk and especially the finest quality. The manufacture of Yankee cheese requires less care, punctuality, and cleanliness in milking, and the firm buys its American Sweitzer from makers preferably of Swiss or Dutch birth and education. The Yankees are too careless. Swiss cheese has to undergo a long process of fermentation, and bad milk shows itself during this process and makes bad places in the cheese.

The main point in the above opinion is coming to be a vital one among cheese dairymen. The first requisite for making good cheese is clean and wholesome milk. This is the foundation of the dairy business, and until the farmers themselves appreciate this and strive to produce such milk, all efforts of the makers of cheese must be more or less ineffectual. A great deal has been said and written on cleanliness in the dairy, but when dairymen think of that subject they generally apply it to the utensils and receptacles of the milk and manufacturing rooms. It must, however, go back of all that and be applied to the external condition of the cow, to her daily surroundings, to the hands of the milker, and to the care taken in milking. The condition in which the bowl of a separator is left, after a mess of milk has passed through it, is enough to convince anyone who has seen and smelt of it that a mass of filth is to be found in average milk as it comes from the average milking stable. The average farmer is too apt to think that the factory man who insists upon having clean, untainted milk is a crank, and to neglect the regulations prescribed by him for obtaining a pure article. But the truth is that our cheese will never reach the standard of European quality until this fundamental cleanliness in the care of the cow and the milking is understood and adopted by our dairymen.

DAIRY BOARDS OF TRADE IN THE STATE OF NEW YORK.

THEIR HISTORY AND PURPOSE.

Dairy boards of trade were first instituted in this country in the year 1871. The first meeting for the purpose of organizing such a board was held at Little Falls March 6, 1871, and the first sales day was May 1. Utica was next in the field, and made its first sales on May 29, while Sinclairville, Chautauqua County, came third, its sales day occurring on June 1. These three markets started within a single month, and Hon. X. A. Willard, of Little Falls, was the leading spirit both at that place and at Sinclairville.

The purpose of these organizations was primarily to help the dairymen. Previous to that time buyers often took advantage of the factory men, who were not as well informed on the markets as the buyers and might not know that an advance was taking place until several days after it had begun. By organizing into boards of trade and not selling cheese at the factories, but only at the weekly meetings of the boards, where the latest quotations were posted in plain sight, the factory men protected themselves against buyers who might be disposed to take advantage of them and were prepared to act with intelligence and in accordance with the latest news of the market. The popularity of these boards is evidenced by the fact that there is not a section in the State where a large cheese interest exists which has not some institution of the kind. At Canton, Watertown, Ogdensburg, Fulton, and Boonville, besides the places already named, regular organizations have been formed, while at Gouverneur, Norwich, Lowville, Cattaraugus, and Cuba a regular weekly market is held without any formal organization. The years when the regular boards were first established are as follows: Little Falls, Utica, and Sinclairville in 1871; Canton, 1876; Watertown, 1879; Ogdensburg, 1880; Fulton, about 1882; Boonville, 1894.

Utica has been the heaviest cheese market in the country from the start. There were two reasons for this: It could always be reached in a night by buyers from New York, and there was more full-cream cheese to be had there than at Little Falls. The transactions of 1871, the first year of the Utica market, were only 45,000 boxes. In 1873 they ran up to 100,000 boxes. In 1877 they had reached 210,713 boxes. The next year (1878) they were 322,535 boxes, but it was ten years before another hundred thousand had been added to this. In 1888 the transactions amounted to 409,564 boxes, although on account of lower prices the value of cheese sold was $2,187,071, against $2,415,581 the year before, when the sales were 22,000 boxes less. Even in 1889, when transactions reached the largest total ever known on that market, viz, 441,386 boxes, the value of cheese sold was only $2,294,500 because of still further shrinkage in prices. While therefore the heaviest transactions took place in 1889, the sales brought the largest amount of money in 1887. Since 1889 the amount of cheese marketed here has gradually shrunk away, until in the year 1895 it was only 218,545 boxes, which brings it down within about 8,000 boxes of the marketings in 1877. The average price also was so much lower than any other in the history of the board that the value of the cheese was only $1,002,859, against a value of $1,077,431 in 1876, the first year that values were reported, and when the transactions were only 167,355 boxes. One cause of the falling off in sales at Utica was the establishment of the board of trade at Boonville in 1894, which drew off about 40,000 boxes that were formerly marketed at Utica. Another cause that has operated increasingly for several years past was the building of milk stations (for city supply) on railroads running south from Utica, which took away a great deal of milk that was previously carried to cheese factories. These causes show that the heavy shrinkage of transactions at this market in the last six years is due only partially to a diminution in the production of cheese. Nearly all the milk, however, which is taken to the stations was formerly converted into cheese, and there is no doubt that even in a good year for feed the cheese production would now show a heavy decrease in comparison with that of 1890. Milk routes are gradually extending farther and farther into the interior of the State, and stations have been built in 1896 on roads that have never before carried milk. All this is of course a help to those who remain in the cheese dairying business, as it will leave just so much less of their product to be marketed and make it easier to dispose of. Generally speaking, all the milk that is taken to the stations and sold to go to New York, at least in cheese-making sections, has formerly been taken to the cheese factories and would go there now if it were not for this new outlet.

METHODS OF SALE AND SHIPMENT.

Nowadays cheese is never brought to the boards of trade when the factory men go to make their sales. Buyers know the factories by their reputation, and they often drive through the country to examine the cheese on the shelves. Besides, when they buy the cheese there is a tacit understanding, or sometimes a positive agreement, that the stock must come up to a certain standard in quality, especially when it is recommended and bought as first quality. When it arrives at its destination it is examined by an inspector, and if it is found to be inferior the factory is obliged to submit to a reduction in the price. Sometimes a few boxes only are not up to the standard; in this case these few are "rejected" and sold in open market for whatever price they will bring, and the factory bears whatever loss there may be on them. Cheese is shipped from the factory to any point the buyer may direct. If a buyer sells to a Western firm, or rather buys for one on an order, he directs the cheese sent straight from the factory to that firm. When going to New York they are often shipped two or three days before the meeting of the board in the shipper's own name, and at the board the bill of lading is turned over to whatever buyer happens to take them.

CHEESE FACTORIES IN NEW YORK.

INTRODUCTION, INCREASE, AND PRESENT NUMBER.

The story of the introduction of cheese factories has been so often rehearsed that it is not necessary to repeat it here. But it may be desirable to note certain facts in relation to their increase and management that are not so well known outside of those dairymen who keep close watch of the statistics. It has already been stated that the first cheese factory was started by Jesse Williams in Oneida County in the year 1851. The advantages of such an establishment soon became apparent to dairymen who possessed the privilege of living near it, but the knowledge of these advantages was slow in spreading through the other States. In the report of the New York State Agricultural Society for 1862, Mr. Willard enumerates 34 cheese factories in Oneida County in 1861, ten years after their introduction, and says there are other factories in Herkimer, Cortland, Jefferson, and Lewis counties. At the same time, he says the system "has not been sufficiently tested to render it certain that it is to displace entirely the old methods." Under most of the censuses that have included dairy statistics, cheese factories and creameries have been put together, and the total number of the two combined has been given instead of the number of each separately. This makes it difficult to state what the number of cheese factories was in any particular year. According to Bulletin No. 1 of the Dairy Division of the Department of Agriculture at Washington, there were 269 factories in New York in 1864, 484 in 1865, 818 in 1870, and 1,018 in 1875. In 1880 the whole number of factories and creameries was 1,652, while in 1890 they seemed to have diminished to 1,337. In 1893 the State commissioner of agriculture made an enumeration which showed the existence of 1,156 factories and 213 creameries, a total of 1,369, or a small increase over 1890. Again in 1894 a similar enumeration was made, showing 1,032 factories and 311 creameries, or a total of 1,343, a diminution of 26, which brought the number down to within 6 of the number in 1890. These are the latest statistics taken, and as they stand it would appear that the whole number of establishments in which cheese was made was greater in the year 1880. This is no doubt correct, as our cheese production reached its highest point in 1881.

One of the State dairy laws in 1885 authorized the State commissioner to issue a brand for New York State Full Cream Cheese, and fixed a heavy penalty for its use on any cheese that was not full cream. The factories did not take up the use of this brand very readily, apparently for the reason that many of them made skim cheese in the fall, and could not place the brand on this class of goods. Dealers, however, appreciated the value of the brand, and gradually came to make demands for it, so that in the year 1890 Commissioner Brown gave a list of 757 factories which had used it that season. In 1891 the number had risen to 796, but by 1894 it had decreased to 773. According to this latest enumeration, Cattaraugus County stands first, with 102 factories using the brand; Oneida County comes next, with 96, and Allegany third, with 91. Then follow, at a considerable distance behind, Lewis, with 69; Herkimer and Oswego each with 66, and Jefferson, with 63. Of the remaining cheese counties comparatively few use the brand.

SIZE OF FACTORIES.

There is a wide difference in the sizes of cheese factories. Some make only 5 or 6 cheeses a day; others make as many as 22 in the height of the season. A factory of average size will produce from 8 to 10 cheeses a day. Five cheeses a day would require about 3,000 pounds of milk. As a rule, the smallest factory would use the milk of about 150 cows; the average factory would take the milk of 300; while the largest would have the patronage of from 500 to 600. The number of patrons is so variable that it is impossible to give any idea concerning it that would be trustworthy. One farmer has 5 cows, while his neighbor may have 50. The larger dairies are more apt to go to the large factories, hence the number of patrons at a small factory is liable to be out of all proportion to the number contributing to a large factory. So the amount of cheese made in a cheddar factory ranges from 19,000 or 20,000 pounds in a season up to 220,000 pounds, or even more. An average factory will make from 36,000 to 40,000 pounds.

The location of patrons with regard to the distance from the factory varies from one-half mile to 3 miles. Generally they come within a radius of about 2½ miles. The milk has to be delivered at the factory by 8 a. m., or sometimes earlier, and it is hardly feasible to do the milking and haul the milk more than three miles before that time in the morning. It is sometimes delivered twice a day, at morning and at night, and this trouble of hauling is regarded as one of the main items in deciding upon the location of a factory. It makes but little difference in the expense, however, as the farmer usually drives the milk to the factory himself and uses his own horses to do the hauling.

SYSTEM OF MANAGEMENT.

There is practically no difference in the system of factory management at the present time.

Originally the milk received at the pioneer factory was wholly purchased by the manufacturers, it being estimated and paid for by the amount of curd it produced when pressed. This was not satisfactory, so dairymen were left to accept a price for their milk or curd which the manufacturers felt safe in offering, or to allow them $1 per hundredweight of cheese manufactured and the whey for performing the work of making, curing, preparing for market, selling the cheese, receiving and disbursing the money, the dairyman paying all other expenses, as boxes, bandages, salt, rennet, etc.[1]

Coming down to our own time, it is found that factory men receive $1 per hundredweight for making, as they did thirty years ago, but for that sum furnish all the extras which are enumerated above as being paid for by the dairymen. The factory may be owned by a single proprietor or by a stock company, but the system of management is the same in either case. Generally a settlement is made with the patrons once in two weeks. Few factories in New York have as yet adopted the method of paying on the basis of fat contained in the milk, consequently each man is credited with the total weight of milk he brings, an average is made each time of the amount of milk it takes to make one pound of cheese, and the patron is paid in accordance with this average on the basis of the price per pound of the two sales of cheese put together. The average factory season runs from April 1 to November 1. Some of the large establishments run three or four weeks later but these are exceptions. After the factory has closed dairymen use their milk to make the winter supply of butter for themselves and their neighbors.

There is little difference in the practice of factories as to the length of time allowed for curing their cheese. It ranges from eighteen to twenty-five days, according to the season of the year. In the spring, when makers are anxious to get rid of their fodder cheese and to take advantage of the market before prices decline, it is shipped at eighteen to twenty days from the hoop. Later in the year it is held longer, in order to cure it better and give it safer keeping qualities. It used to be the custom with some factory men to hold their cheese in the fall and again take advantage of the higher prices that are apt to prevail late in the season. This is still done to some extent, but so many factory men have lost money on their cheese in the last two or three years by trying this experiment that it is not now practiced to the same extent as formerly.

FROM FACTORY TO TABLE.

Now let us take a piece of cheese at the factory and follow it till it reaches the hands of the consumer. Suppose it sells at a board of trade for 6½ cents per pound. In a general way this may be calculated at 65 cents per 100 pounds of milk. In old times that amount of milk would make 10 pounds of cheese, although for a year past it has taken an average of about 105 pounds to make 10 pounds of cheese. This would deduct 1 cent per pound from the price obtained for the cheese as the cost of manufacturing, leaving 55 cents to the dairyman for his hundredweight of milk. The wholesale cheese business has always been a very close one, and considering the amount of money used in it during a year, the profits are probably smaller than in any other line of trade. The original buyer is very lucky if he gets a commission of one-eighth of a cent per pound. Freight from different points in the State to New York City varies somewhat with the distance, but an average of 25 cents per hundredweight will about cover it. This and the commission to buyer makes the cheese cost in New York City 6⅞ cents. The merchant in that city expects to make a profit of one-fourth to three-eighths of a cent if the goods are sold soon after their purchase. This brings the price up to 7¼ cents, which the retailer has to pay. Then comes the charge which does so much to hinder the consumption of cheese in this country. Retailers are not content to take a moderate profit, but must have from 50 to 75 per cent advance on the cost of the goods. The common price of cheese at a grocery store, when it costs the retailer from 7¼ to 7½ cents, is 14 cents per pound. In England, all through the season of 1895, cheese sold at 5d., or 10 cents, retail, and in 1896 it has sold there as low as 4½d., or 9 cents, per pound. When American grocerymen are willing to accept as moderate a profit on cheese as the English retailer, and sell it on the same plane as they sell butter, at an advance, say, of 20 to 25 per cent over cost, then we may expect to see the consumption largely increased; but so long as they persist in demanding such an enormous profit as they have done in the past, cheese will be looked upon as a luxury and only those will buy it who can afford to indulge in luxuries.

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[1] Report of American Dairymen's Association for 1864, p. 49. Paper by George Williams, son of the founder of the factory system.

THE FUTURE OF THE AMERICAN CHEESE TRADE.

CAUSES OF DISCOURAGEMENT.

Canadian competition.—Certain features which militate against the cheese business in this country have already been mentioned, but there are others that may prove quite as serious. There is no doubt that Canada will continue to increase her make as long as she can find a market for the goods. If it were not for our duty on foreign cheese, the Canadian product would surely invade the States, for the reason that the dairymen of Canada live more economically than our dairymen and can afford to produce goods cheaper. Our duty on cheese protects us against this invasion, and the Canadians must therefore seek their markets in Great Britain and elsewhere. In order to do this most successfully, they are aware that their product must be hedged about with every restriction that will prove a guaranty of its genuineness. Their laws are framed with express reference to this guaranty, and the buyer is thus positively assured not only that Canadian cheese contains all the essential parts of the milk, but that it does not contain any foreign substance whatever. This legal requirement gives confidence in the cheese abroad and causes it to be sought in preference to stock from this country, of which so much has been adulterated that it is all looked upon with suspicion. One State has one law on the subject and another State has another law, while still another has none at all. It has become self-evident that we must have a national law which will affect the whole cheese product alike, and it will place it on the same footing with that of our Canadian neighbors. With such a law in existence, it will be the fault of our dairymen and cheese makers themselves if their product does not meet with as ready sale as that of the Provinces. It is true that Canada has fostered this industry by large grants of money and by the creation of a department whose special business it is to see that every cheese maker in the Dominion is well instructed before he begins his work, and that he receives additional instruction each year to enable him to keep up with the march of improvement. In our country the States in which cheese is made have many other ways of using their money, and unfortunately too often prefer to appropriate it for purposes dictated by political partisanship. As a consequence, the majority of our cheese makers are too apt to go on in their old and often careless methods, with no one to instruct them or to suggest a better method. The exception to this is found in the case of "combinations" of factories. Here a number of factories are brought under the control of one man, the proprietor or a superintendent. He says to his makers, "I want all of our cheese to be uniform in quality, and in order to have them so they must all be made by the same rule and on the same plan. None of you can exercise independent judgment in this matter, but all must conform strictly to the instructions laid down by the company." By this means the combination avoids the rock upon which too many of the separate factories go to pieces. That rock is the idea of the maker that he knows as much as anyone else on the subject of cheese making and his unwillingness to try to learn even when he has the chance. Canada is one big combination under the direction of its thoroughly capable dairy commissioner. He lays down the rules and all the factories follow them; hence the excellence and uniformity of Canadian cheese.

Australasian competition.—But Canada is not our only competitor. For a number of years New Zealand has shipped a considerable amount of cheese to England, although it is understood that her product is not equal in quality to that of either Canada or the United States. In 1894, however, a more successful rival appeared in the shipments from Australia. For several seasons down to 1892 the Victoria government had paid a bounty to butter makers who exported their butter to the mother country, and having placed that industry on its feet, the government withdrew the bounty. Then a few cheese factories were established in the colony, and in 1894 a bounty of 6s. per hundredweight was placed on all cheese manufactured in the colony which could be proved to have brought the producer or exporter more than 50s. per hundredweight. In the spring of 1894 the first shipment of these goods arrived in London, consisting of 1,430 cases, 2 cheese in a case. These sold at 55 to 60s., at a time when Americans were selling at 59s. for the best, thus showing that the quality was quite equal to our own. The American was of course old cheese at that time of the year, while the Victorian cheese was newer by several months, and in reality the former ought to have brought the best price in order to put the two on a par at the same age. Again last year Victorian stock was in evidence, but very little of it could have received the bounty, as American sold early in the season at 48s. and for a long time in the summer stood at 37s. 6d. to 38s. 6d., and Australian would probably command not much better prices. At the same time cheese can be produced in Victoria much cheaper than in this country. The climate is so mild that the farmers are not obliged to build cattle barns, but allow the cows to remain out the whole season and milk them for nine or ten months. In the early months of 1895 they received about 60 cents per 100 pounds for their milk, and it was said that under their favorable conditions they could produce it at 50 cents or less and still get a fair living out of the business. This is more than can be said of our own dairymen, who complain loudly if they are obliged to accept 60 cents, and who probably could not afford to produce it for that price under the present conditions of living. Australia and New Zealand sent upward of 4,000 tons of cheese to England in the early season of 1895, and they will probably continue to send increasing quantities in the present and subsequent years. This competition must therefore be met on an equal basis if we expect to continue sending cheese abroad.

The lessened exports.—The receipts of cheese at New York and the exports from that port tell the story of diminution in foreign demand. In 1890 the exports were 65 per cent of the receipts; in 1891 they were 63 per cent; in 1892, 67 per cent; in 1893, 60 per cent; in 1894, 67½ per cent, and in 1895, only 43 per cent. The prices in New York on May 1 in each of these years were as follows: In 1890, 11¼ cents; in 1892, 10 cents; in 1893, 11 cents; in 1894, 10¾ cents; in 1895, 8 cents. The average price for the season on the Utica Board of Trade, which is the largest cheese market in the interior of the country, was as follows: 1890, 0.0842; 1891, 0.0888; 1892, 0.0933; 1893, 0.09647; 1894, 0.09465; 1895, 0.07648; and all this is in the face of a severely diminished production. Is it any wonder that our dairymen feel like throwing up the business and engaging in some other branch of agriculture? Is it not natural that they should ask, Where is our cheese to be marketed and what will be its price?

Weighed down by these unfavorable circumstances, as well as by the faulty manufacture of much of our own cheese and by the counterfeit stock that has flooded the foreign and Southern markets, is it any wonder that our dairymen feel disheartened at the enormous decrease in the volume of exports?

Filled cheese.—Within the last two or three years immense quantities of filled cheese have been shipped into nonproducing States, most of it with the label of "Full-cream cheese," but at prices just enough below those of the genuine article to insure it a rapid sale. Quality being equally good, or, what is nearly the same thing until the facts are found out, appearances being equally good, the buyer will take those goods on which he can make the most money. And the filled-cheese makers have been exceedingly wise in their day and generation. They have studied carefully every point that would help the sale of their product. Their cheese are well boxed; they have perfectly level, smooth surfaces on top and bottom, with square and even edges; they are bright and handsome in color; they are made solid, and show good body under the trier. In all these respects filled-cheese makers set a good example to the makers of real cheese. They known that appearance has great influence in the sale of any kind of goods, and they have therefore made an exhaustive study of appearance, which it would be for the interest of makers of full cream cheese to imitate. But the crime of the filled-cheese men, for it is nothing less than a crime to destroy by unfair means a legitimate industry upon which hundreds of thousands of people depend for their support, is that they put their product on the market under a false name and sell it not for what it is but for what it is not. No fair-minded man would complain if filled cheese was branded with its real name and sold as such; but when it is branded as full cream cheese and used to fill contracts for that class of goods, every fair-minded man will declare that the law must step in to prevent such deception. At all events, it is the practice of this deception which has wrought such havoc with the trade in full cream cheese at the South and in far Western States. The imitation goods have taken the place of the genuine by means of assuming the name of the genuine and by being sold at a lower price. Thus the genuine has been crowded out of market even in a season of such light production as that of 1895.[1]

The new law.—In the State of New York existing laws still further aggravate the situation by forbidding the saloons to offer free lunches, thus closing one of the largest agencies for the consumption of cheese. It is estimated that the saloons of Greater New York used from 8,000,000 to 12,000,000 pounds of cheese per year; and if those of the rest of the State be added to this it would bring the total consumption by means of free lunches up to at least 15,000,000 pounds, or about one-sixth of the total production of the State last year. This law is one of the severest blows yet inflicted on the cheese industry. Whether it will be permanent remains open to question. A repeal of this clause in the present law is not improbable, but it must stand during the year 1896 at least.

SOME GROUNDS FOR ENCOURAGEMENT.

And yet, with all these discouragements, the situation is far from being devoid of hopeful aspects. The question naturally arises, What must our dairymen and cheese factory men do to improve the conditions surrounding their industry? The first and most obvious thing to be done is to make better cheese, cheese which when brought into competition with the foreign will possess just as fine flavor and just as long-keeping qualities as that product. This is one of the self-evident propositions which it hardly seems necessary to spend any time in discussing. It is, however, a vital point, and must be looked after with all the ability, shrewdness, and skill that our makers can bring to bear upon it. With an equally fine quality of cheese, we can hope to compete with Canada in the markets of the Old World; without this quality, we shall eventually have to give up those markets altogether.

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[1] It should be noted that this report was mainly prepared before the passage by Congress of the act approved June 6, 1896, requiring distinct branding of all filled cheese and placing special taxes upon its manufacture and sale.

In the next place, our merchants must struggle to retain the markets of the South and West. The national law in the interests of pure food, which compels "filled" cheese to be plainly branded, will oblige the makers of that article to sell it on its merits only. This will necessitate their selling it at a much lower price if it is sold at all, and will destroy its rivalry with full cream cheese, under the name of which it has heretofore been marketed. The enforcement of this law ought to go a long way toward restoring the trade in genuine cheese throughout the South, which was almost ruined in the year 1895 by the sale of the counterfeit goods. The restoration of this class of home trade will materially help our cheese industry, particularly those establishments that make cheese weighing from 34 to 40 pounds.

A third suggestion for relieving cheese dairymen is that a portion of them should follow out the line hinted at on page 29. If the manufacture of cheese was more diversified, if a greater number of varieties were made, instead of confining the manufacture so largely to Cheddar cheese, there would be profit in it for those who made the varieties and relief for those who did not adopt that course. In the reports of fancy cheese factories it has been seen that the prices of their products were but little affected by the decline in Cheddar cheese. It may be said that this is because there are comparatively so few of them and the competition is so limited. There is probably some truth in this view of the matter, but it is also true that a choice, palatable article will always find a good market. The amount of fancy cheese sold shows that a fine, small-sized cheese is in demand, and these goods bring considerably higher prices than ordinary cheese. Most of it is so made that it possesses long-keeping quality, which is always an advantage, both to the maker and the merchant who deals in it. Besides, there is still room for other varieties, as it has been shown that considerable cheese is imported from foreign countries which might be made in this country, providing the requisite care and skill were exercised. The population of the United States is increasing with much greater rapidity than its dairy interests, and down to the time when filled cheese began to make such inroads upon the home trade the surplus cheese left by the gradual diminution of our foreign trade was being fairly well consumed by our own people. Even with the enormous shrinkage in our exports last year (1895), which was much heavier than the shrinkage in our manufacture, the stocks of old cheese on hand in our markets in the spring of 1896 were smaller than they were a year before; it is a fair inference that, if our markets are not handicapped by filled cheese, the home consumption will be able to take care of a larger surplus than we had last year. With proper laws to protect the cheese industry against frauds, with greater variety in the styles of cheese made, and with an improvement in the quality of our goods, there is no good reason why our cheese dairies should not become as prosperous as they were before the disastrous season of 1895.

FACTORY CHEESE AND HOW IT IS MADE.

By G. MERRY,[1] *of Verona, N. Y.*

MODERN METHODS PRACTICED IN THE UNITED STATES.

The successful cheese maker considers good milk of paramount importance. For this he must depend upon the producers and his own watchfulness.

Handling milk.—The first step in the process of making cheese—the care and handling of the milk—devolves upon the farmer. If up to date, he must have a good herd of cows, treat them kindly, and provide them with plenty of clean, wholesome food and pure water. As the quality of milk depends much upon the management of the cow, pure milk may be expected from a well-cared-for dairy. After the milking is completed, the milk should be immediately taken from the stable and well aërated, or brought in contact with the air, either by running thinly over a flat or fluted surface, or passing from one vessel to another in fine streams or thin sheets. Milk should be aërated in a place where the air is fresh and pure, being free from stable or other objectionable odors. As the object is to remove the so-called animal odors from the milk, it would be useless to perform the work in an atmosphere laden with the same or worse smells than it is desired to expel. When delivery to the factory is but once a day, the night's milk, after being aërated, is cooled to 70° F. or less; this is necessary to insure the keeping quality of the milk and its arrival at the factory in good condition.

All cans, pails, strainers, and whatever utensils come in contact with the milk must be thoroughly washed with the aid of some cleanser, such as soap or salt, rinsed with boiling water or exposed to live steam, and placed where they will be thoroughly aired. By this means they are kept sweet and free from taint.

The milk is all delivered at the factory in the morning between the hours of 5 and 8 o'clock. The night and morning's milk should be brought separately, although it is sometimes mixed where the quantity supplied by a patron is small. The cheese maker knows it is his duty to receive no milk unless in proper condition. He stands at the receiving window, and by the use of his eyes and nose is able to detect any impure milk; all such must be absolutely rejected. He must have the experience and force of character to impartially perform this duty.

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[1] Mr. Merry is a practical cheese maker operating a factory at Verona, and has repeatedly won high prizes for his work. He has prepared this chapter by special request.

Upon the milk being accepted, it is poured into the receiving can, and a small sample is taken at this time for the fat test to be made later.

Sampling milk.—For sampling, a deep cylindrical cup holding about 1 ounce is used. This sample of milk is poured into a bottle large enough to hold 12 or 14 times such samples and bearing the number of the patron whose delivery of milk is sampled. One such bottle or jar is provided for every patron. A sample of each patron's milk is put into the proper bottle every day for ten days or more, and from this composite sample, as it is called, the test is made by the Babcock method of the fat contained in this patron's milk. A small amount of corrosive sublimate,[1]—about as much as can be taken on the point of a common penknife—is put into the bottle previous to saving the first sample; this prevents the milk from souring and preserves it in a suitable condition for testing. After sampling, the milk is weighed and the patron credited with the number of pounds of milk he delivers. The milk is then run from the receiving can through a tin conductor into the storage vats. Each vat ordinarily holds about 5,000 pounds of milk.

Heating milk.—The temperature of the milk is then raised, heat being applied as follows: Between the wooden part of the vat and the tin lining there is an open space, which is filled with water; the water is heated by steam introduced through perforated pipes running in this space along the whole length of the vat. The warm water thus surrounding the tin lining of the vat gradually raises the temperature of the milk. The heating should begin while the vat is filling or as soon as filled, and should not be done too fast. After the required temperature of 82° F. to 86° F. is reached, the heating is stopped. The heating of the first vat usually begins at 6 o'clock or soon after, and all milk should arrive so the heating of the last lot may begin not later than 8 o'clock.

Determining ripeness.—The next step is to ascertain if the milk is in a condition ripe enough to add the rennet. Perhaps the most satisfactory method to determine the ripeness of the milk is the rennet test. The following specially prepared apparatus is necessary: An enameled cup, graduated on the inside, with a fine hole in the bottom, a pipette of 1 cubic centimeter, and a small bottle marked on the neck. With the pipette 1 cubic centimeter of rennet extract is measured into this bottle, which is then filled with water to the mark on the neck, not forgetting to rinse the pipette into the bottle. If the extract used be of standard strength, this will give a uniform solution at all times. The cup is then filled with milk and set on the edge of the vat. When enough milk has run from the cup to bring the surface of the milk down to the zero or first mark on the inside, the diluted rennet is quickly added, the whole stirred well, and the cup left undisturbed. The milk in the cup is closely watched, and as soon as coagulation takes place it will stop running through the fine hole in the bottom of the cup. The graduation on the inside of the cup will show the amount of milk which has run out, and from this the maker knows the degree of ripeness which the milk has attained. This little operation requires some skill and experience.[1] The temperature of the milk and the strength of the rennet being always uniform, the variation in the amount of milk running from the cup before coagulation takes place will depend solely upon the degree of acidity of the milk.

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[1] Other substances, among them bichromate of potash and formaldehyde, having a similar effect, are also used as preservatives.

When the milk is very sweet the ripening process is hastened by using a small quantity of clean sour milk, free from any taint. If this milk is thick, it is strained through a cloth so there will be no little lumps of loppered milk put into the vat. The milk should be so ripened that it will take from three and one-half to four hours from the time the rennet is added until the curd is ready to press. The degree of ripeness necessary to accomplish this result is only to be determined by experiment on the part of the maker. The condition of milk and degree of ripeness necessary will vary somewhat in different factories, and the cheese maker has to use his judgment at such times. When cheese is to be colored the coloring extract is put into the milk in the vat and well mixed in at least ten minutes before adding the rennet.

Handling the curd.—When, in the judgment of the maker, the milk is ready to proceed, sufficient rennet is added to coagulate the mass in about 30 minutes. The curd being set, it is ready to cut when it will break clean over the finger. For cutting the curd two forms of gang knives are used, a horizontal and a perpendicular knife, with blades about one-third to one-half inch apart. The curd is cut lengthwise and crosswise of the vat with each knife. This amount of cutting leaves the curd in cubes of about one-third of an inch on a side. The degree of fineness into which the curd must be cut depends on the ripeness of the milk, and is a matter which must be determined by the manner in which the moisture is expelled from the curd before the whey is drawn. It is usually about an hour and a half from the time heat is applied to the vat until the curd is cut. After cutting, the curd is gently agitated, to prevent it from settling to the bottom of the vat and matting together. The stirring allows the curd to shrink and expel the whey, or a portion of it. The kernel or small cube or lump of curd forms a thin skin or film over its surface, which prevents the fat globules and other cheese constituents from working out into the whey. The stirring of the curd after it is cut may be done by a hand tool called the curd rake. But a better factory appliance for this purpose is the "automatic curd agitator," which is attached to the vat and operated by steam. There are at least three different patterns of these agitators which do the work more satisfactorily than the hand rake. After stirring the curd for about ten minutes heat is applied again to the vat through its water jacket, slowly at first, as if heated too fast the pieces of curd would cook on the outside and thus hold in the whey. After a temperature of about 92° F. is secured the curd is heated faster until the required temperature of 97° to 100° F. is reached. This process, which is often called "cooking the curd," usually takes about one hour's time. During the heating process the curd is continually stirred and not allowed to get lumpy or to mat in the least. All the kernels must be kept separate to insure an even cooking. After the required temperature is reached the curd is still agitated for a few moments. The vat is then covered to assist in holding the curd at an even temperature until ready to draw the whey. If the heat drops it is again raised to the original temperature. It is important to know when the curd is cooked enough. This the cheese maker determines by taking a double handful and pressing together in his hands. If on removing one hand the curd readily falls apart it is cooked enough, otherwise it will be soft and hang together in a ball. When the curd will string about one-fourth to one-third of an inch on the hot iron the whey is drawn. The time occupied from the beginning of the cooking until the whey is drawn varies from two to four hours, averaging two and one-half to three hours.

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[1] This is known as the Marschall test, the simple apparatus being sold by dairy-supply houses.

In using the hot-iron test a small amount of curd is compressed in the hand until dry. This, when touched to a hot iron and slowly drawn away, will leave fine silky threads sticking to the iron if any acid has developed. The amount of acid is determined by the length of these strings. Any piece of bright, clean iron one-half inch in diameter and about 18 inches long will answer for this purpose.

After drawing the whey the curd is stirred somewhat and thrown up on each side of the vat. The vat is lowered at one end to make an incline to allow the whey to drain away from the curd. As the whey passes off and the curd becomes dry it becomes matted together and is then cut in pieces about 6 inches square and piled one on top of the other in one end of the vat. The curd is now turned as often as once in ten or fifteen minutes and piled in larger piles as fast as it will allow, always keeping in mind the fact that the surplus moisture must be expelled if we wish to make a good-keeping cheese. If curd is in a good condition it is kept warm by covering with a cloth and repiled occasionally. The curd soon becomes firm, and when a piece is taken in the hand it will feel velvety and pull apart in flakes. At this stage the curd will pull from three-fourths to 1½ inches on the hot iron. The curd is now ground and salted, using from 2 to 2¾ pounds of salt to 1,000 pounds of milk. The salt is well stirred in and curd allowed to lie in the vat, with an occasional stirring, until salt is all dissolved and curd feels smooth and silky; it is then ready to press. The average time occupied from drawing the whey to this point is two hours, and from first heating the milk to the beginning of pressing the time is from five to six hours.

There are several kinds of mills for grinding curd. The one most commonly used consists of two cylinders covered with teeth and revolving toward each other, which pick the curd to pieces. The mill fits across the vat and the curd is ground through it into the vat.

The curd when ready for pressing is dipped from the vat with a flat-sided curd pail and put in the hoops, an equal amount being measured into each hoop. The hoops are immediately placed in the press and pressure applied.

There are several kinds of hoops, the most common sizes being the 14½ by 10 inch and the 13½ by 6 inch—that is, the hoops press cheese of those sizes. The bandage is put on an iron rim called a bandager, which slips into the top of the hoop and holds the bandage in place, with the lower edge of bandage turned in for about an inch on the bottom of the hoop, a cap cloth being first put in the bottom of the hoop.

There are times during the season, usually in the summer months, when curds have a tendency to be mushy, and will not become firm if piled. These curds are handled differently, being left in the whey longer—in fact as long as the maker deems it safe. The whey is then drawn and curd stirred thoroughly until it feels dry. It is then spread out over the vat, kept cool, and handled often in order to expel the moisture. When the curd becomes firm it is ground and salted, the salt thoroughly stirred in and the curd put in hoops and pressed at once. These curds if allowed to get mushy will make what is known as an oily cheese. The cause of this is found to be due mainly to a lack of the proper proportion of casein in the milk.

Pressing and curing.—The pressing of the cheese is done lightly at first and afterwards the pressure is gradually increased. After pressing about an hour the cheese is taken out and turned over in the hoops, the bandage carefully turned down and cap cloth put on smoothly. Pressure is then applied stronger and oftener until the limit of the press is reached. The cheeses are kept under the pressure for sixteen or eighteen hours, when they are taken out of the hoop and placed in the curing room. The cap cloths are left on the cheeses until they are ready for market.

The curing room is built with a wind-proof wall to guard against sudden changes in temperature, and provided with tight windows and blinds. The room is kept as nearly as possible at a temperature of 65° to 70° F., and should be well ventilated, so that the cheese may cure properly and have a clean flavor. The room should have tables, upon which the cheeses are turned and wiped. The cheeses, after being placed in the curing room, are turned over every morning and kept clean and free from mold and dirt; the tables are also wiped clean, using some canvas cloth for this purpose. The curing room is darkened during the day to keep it free from flies; in warm weather the windows and blinds are closed in the daytime to exclude the heat, and thrown open at night to cool the room. The cheeses remain in the curing room on an average of three to four weeks. The conditions governing this variation in length of time are due to the differences in the manufacture of the cheese, temperature of curing room, and the state of the cheese market.

When ready for market, the cap cloths are removed from the cheeses and they are boxed; a scale board is placed in the bottom of each box and one on top of each cheese put in the box. The boxes are evenly trimmed to within one-eighth to one-fourth of an inch of the top of the cheees and the cover put on. The official State brand is put on the top of both the cheese and the box, and the manufacturer's or factory brand is also usually put on the box.

The foregoing is a description of the latest improved methods practiced in factories in the State of New York, where cheese of the usual 60-pound Cheddar form and style is made, principally for export.

Cheese for home trade is made in the same way, except that the whey is drawn off as soon as the curd shows any acid by the hot-iron test. The curds are well matured in the vat and salted with about 2 pounds of salt for every 1,000 pounds of milk.

METHOD OF APPORTIONING DIVIDENDS UPON THE FAT-TEST BASIS.

The custom as to time of settlement for milk supplied by patrons varies somewhat with different factories. In most cases computations are made and settlements reached every two weeks, although some use monthly periods. Each settlement is made for a definite period of manufacture, and after the cheese made in that period has been cured, shipped, sold, and paid for.

The quantity of milk which each patron has delivered during the time included in any settlement is taken from the daily records. The test records for the same period give the average per cent of fat which the milk contained during the time, ascertained from fat tests of the composite samples. The total quantity of milk delivered, multiplied by the average per cent of fat, gives the number of pounds of fat delivered by the patron during the period considered. This is the basis for settlement. From the gross receipts for cheese sold for the period the expense of manufacturing is deducted and the net proceeds of sales are divided by the total number of pounds of fat delivered by all the patrons during that period; the quotient is the net amount for each pound of milk fat which has been realized by the sales of cheese. Each patron is to be paid at this rate for the number of pounds of fat contained in the milk furnished by him.

For illustration, take the examples following, to cover a period of one month: A delivers during the first ten days of the month 1,500 pounds of milk testing 3.2 per cent of fat; during the next ten days 1,700 pounds testing 3 per cent, and during the last ten days 1,600 pounds testing 3.1 per cent. B delivers during the first ten days 2,500 pounds of milk testing 3.6 per cent; the next ten days 2,700 pounds testing 3.5 per cent, and the last ten days 2,800 pounds testing 3.7 per cent. C delivers 2,000 pounds testing 4 per cent the first ten days; 2,200 pounds testing 4.1 per cent the next ten days, and 2,400 pounds testing 4.2 per cent the last ten days. We find the total of milk delivered by all to be 19,400 pounds; total number of pounds of fat, 707.7. Supposing that from this milk 1,940 pounds of cheese was made, selling at 10 cents per pound, the following figures will be found upon the record books of the factory:

Gross receipts, 1,940 pounds of cheese, at 10 cents	$194.00
Deduct cost of making and furnishing cheese at $1 per hundredweight	19.40
Net proceeds to be paid to patrons	174.60
$174.60 divided by 707.7, the total pounds of fat, gives the net price per pound of fat to patrons as	$0.24671+
Average per cent of fat in all milks	3.64+
Number of pounds of milk to 1 pound of cheese	10

Settlements with individual patrons:

	Milk.	Fat.		Payment or dividend.
	Pounds.	*Per cent.*	*Pounds.*	
A:				
First 10 days	1,500	3.2	48	
Next 10 days	1,700	3	51	
Last 10 days	1,600	3.1	49.60	
	4,800		148.60, at $0.24671	$36.66
B:				
First 10 days	2,500	3.6	90	
Next 10 days	2,700	3.5	94.50	
Last 10 days	2,800	3.7	103.60	
	8,000		288.10, at .24671	71.08
C:				
First 10 days	2,000	4	.80	
Next 10 days	2,200	4.1	90.20	
Last 10 days	2,400	4.2	100.80	
	6,600		271 , at .24671	66.86
Total				174.60

A statement similar to the following is given monthly to every patron:

September dividend, 1895.

Mr. ——— A———:

Number of pounds of milk received from your dairy during the above-named month, given in separate amounts, with per cent of fat in each, as shown by the Babcock test:	1,500 pounds, 3.2 per cent fat. 1,700 pounds, 3.0 per cent fat. 1,600 pounds, 3.1 per cent fat.
Total	Milk, 4,800 pounds; fat, 148.60 pounds.
Average per cent of fat in all milks delivered at the factory during said month ... per cent	3.64+
Amount of milk required to make 1 pound of cured cheese during said month ... pounds	10
Average price per pound received for the cheese made during said month	$0.10
Net price per pound of fat	$0.24671
Amount of cash now paid to you, being in full for the milk delivered by you during said month, after deducting my charge of $1 per 100 pounds for making the cheese and furnishing materials	$36.66

By this statement the patron can see how much he has delivered during each period covered by the sales, and the testing, and the per cent of fat in his milk during that period. He can also compare the per cent of fat in his milk with the average of all milks delivered at the factory during the month.

In changing from the old method of paying for all milk alike by its weight to the fat basis, the question was brought before our patrons at their regular annual meeting and thoroughly explained. The patrons had been informed some little time previous to the meeting of the intention of taking some action in the matter, and several of them had given thought and study to the new method and were prepared to discuss the question intelligently. After a thorough exchange of opinions a majority were in favor of adopting the new method.

During the first year of using the test the patrons made little objection to its use, preferring to give it a fair trial and note the effects. The conclusion reached by the patrons after this trial was clearly shown at the next annual meeting, when, with but a single objection, it was voted to continue the test method. At the present writing, after three years' practical use of the Babcock test, the patrons would not consent to a return to the old method.

The introduction of the fat basis has resulted in a general improvement of the interests of our factory and the patrons. The quality of the milk being an important factor in determining its value has led to a more systematic method of breeding. Almost every dairyman and patron is giving more thought to the principles governing breeding and is endeavoring to produce a herd giving a large amount of milk of the best quality. He also feels more interest in his work and consequently his milk is better cared for and delivered at the factory in better condition. The cheese maker is thus enabled to produce a finer quality of cheese and also to show an increase in the amount of cheese manufactured from every 100 pounds of milk.

This basis of settlement is certainly far more equitable as well as better, because of the results stated, than the one so long in use and still adhered to by many factories. Canadian authorities now claim, however, that it is not quite fair to depend upon the fat content of the milk alone, but that the casein should also be taken into consideration. More time and experience is necessary to consider this proposition for a further change in the basis of settlement with patrons.

APPENDIX.

TABLES OF CHEESE PRODUCTION AND TRAFFIC.

No trustworthy record of receipts in the city of New York were made previous to 1865. Down to 1878 the record runs from January to January; but from May 1, 1877, the record began to be compiled from the opening of a new season in the receipt of goods, and Table No. I., is arranged accordingly.

TABLE NO. I.—*New York receipts of butter and cheese (in packages).*

Year.	Butter.	Cheese.	Year.	Butter.	Cheese.
1865	607, 136	....	1880	1, 494, 015	2, 833, 678
1866	493, 061	742, 441	1881	1, 423, 717	2, 830, 586
1867	551, 791	1, 302, 132	1882	1, 386, 672	2, 286, 396
1868	502, 906	1, 136, 584	1883	1, 517, 818	2, 486, 612
1869	645, 195	1, 335, 522	1884	1, 618, 270	2, 441, 561
1870	552, 973	1, 495, 969	1885	1, 633, 652	2, 091, 862
1871	480, 767	1, 331, 250	1886	1, 661, 916	1, 861, 457
1872	473, 351	1, 542, 972	1887	1, 690, 447	2, 070, 379
1873	689, 761	1, 809, 689	1888	1, 774, 374	1, 950, 176
1874	995, 430	2, 036, 468	1889	2, 092, 115	1, 953, 522
1875	1, 080, 899	2, 322, 331	1890	1, 843, 702	1, 954, 448
1876	1, 292, 577	2, 171, 617	1891	1, 780, 826	1, 832, 572
1877	1, 269, 759	2, 420, 601	1892	1, 654, 198	1, 999, 029
May 1, 1877, to May 1, 1878.	1, 282, 902	2, 562, 053	1893	1, 711, 466	1, 551, 468
1878	1, 486, 475	2, 309, 168	1894	1, 708, 576	1, 613, 385
1879	1, 508, 859	2, 437, 688	1895	1, 923, 061	1, 259, 990

TABLE NO. II.—*Transactions of the Utica Board of Trade.*

Year.	Number of boxes.	Value.	Average price per pound.	Range of prices.	Year.	Number of boxes.	Value.	Average price per pound.	Range of prices.
			Cents.	*Cents.*				*Cents.*	*Cents.*
1871	45, 000	....	....	....	1884	315, 641	$1, 988, 538	10. 5	8 to 12⅞
1872	75, 000	....	....	....	1885	320, 796	1, 531, 159	7. 955	5 10⅞
1873	100, 000	$1, 495, 965	....	....	1886	325, 962	1, 773, 885	9. 07	6¼ 12¼
1874	154, 800	1, 777, 692	....	11¼ to 16¾	1887	387, 485	2, 415, 581	10. 35	7¾ 12½
1875	160, 320	1, 735, 592	12. 5	10¼ 15⅜	1888	409, 564	2, 187, 071	8. 9	7⅜ 10¾
1876	167, 355	1, 077, 431	11. 1	8¾ 14	1889	441, 386	2, 294, 500	8. 664	7¼ 10⅝
1877	210, 713	1, 425, 877	11. 67	8½ 15	1890	385, 631	1, 948, 207	8. 42	6⅞ 10¼
1878	322, 535	....	....	6¾ 12¾	1891	373, 434	1, 889, 656	8. 85	7 11¼
1879	301, 559	1, 488, 555	8. 227	3 13¼	1892	248, 470	1, 390, 935	9. 63	8¼ 10¾
1880	298, 827	2, 085, 573	11. 632	6½ 14¾	1893	217, 768	1, 260, 484	9. 647	8⅛ 12½
1881	240, 746	1, 615, 184	11. 1818	8½ 13⅝	1894	273, 896	1, 555, 455	9. 465	7¾ 11¼
1882	220, 502	1, 523, 593	11. 5161	10 13	1895	218, 545	1, 002, 859	7. 648	5 10¾
1883	264, 628	2, 025, 291	10. 8437	8 13½	1896	190, 038	895, 649	7. 855	5¾ 10

TABLE NO. III.—*Transactions of the Little Falls Board of Trade.*

Year.	Number of boxes.	Value.	Average price per pound.	Range of prices.	Year.	Number of boxes.	Value.	Average price per pound.	Range of prices.
			Cents.	*Cents.*				*Cents.*	*Cents.*
1875	158, 232	....	12. 5	10¼ to 16	1886	209, 135	$1, 139, 367	9. 08	6 to 12⅛
1876	177, 273	....	10. 83	7 14	1887	229, 017	1, 514, 106	10. 36	7 13
1877	222, 847	$1, 547, 204	11. 819	9 14¾	1888	239, 085	1, 245, 093	8. 95	7¼ 11
1878	281, 618	....	....	6½ 12½	1889	265, 224	1, 337, 776	8. 7	7½ 10⅛
1879	244, 943	1, 149, 566	7. 822	4 13¼	1890	245, 059	1, 181, 836	8. 36	6¾ 10⅛
1880	248, 704	1, 714, 863	11. 492	6½ 14½	1891	236, 249	1, 202, 788	8. 55	7½ 11
1881	253, 025	1, 653, 766	10. 893	7 13	1892	206. 058	1, 218, 662	9. 15	7 10¾
1882	213, 175	1, 468, 836	11. 484	9 12¾	1893	197, 865	1, 106, 337	9. 5	8 11¼
1883	244, 102	1, 581, 989	10. 797	8 13¼	1894	202, 028	1, 088, 474	9. 096	7½ 11
1884	226, 196	1, 407, 391	10. 37	7 13	1895	150, 207	714, 684	7. 93	6 10
1885	208, 067	999, 606	7. 935	5¾ 10⅜	1896	120, 754	564, 259	7. 788	6 9¾

TABLE NO. IV.—*Transactions of Watertown Board of Trade.*

Year.	Number of boxes.	Average price per pound.	Year.	Number of boxes.	Average price per pound.
		Cents.			*Cents.*
1879	50, 813	7. 195	1886	57, 462	9. 08
1880	60, 291	11	1887	42, 376	9. 63
1881	55, 961	9	1888	53, 331	9. 23
1882	56, 807	10. 08	1889	93, 778	8. 82
1883	65, 201	10. 288	1890	106, 068	8. 4
1884	94, 373	9. 09	1894	91, 207	9. 26
1885	47, 983	7. 75	1895	98, 845	....

TABLE NO. V.—*Production of cheese in New York State by counties (in pounds).*

County.	1845.	1850.	1855.	1860.	1865.	1870.	1893.	1894.
Allegany	....	1, 145, 391	1, 044, 978	939, 115	104, 374	220, 880	8, 543, 800	6, 914, 154
Cattaraugus	....	1, 382, 963	1, 717, 484	1, 857, 349	....	889, 132	13, 202, 919	11, 330, 154
Chautauqua	....	2, 271, 890	1, 198, 361	1, 153, 257	782, 257	773, 830	3, 201, 027	2, 669, 873
Chenango	....	1, 069, 331	1, 212, 544	1, 446, 538	1, 879, 363	280, 114	3, 999, 432	5, 212, 631
Erie	....	4, 243, 949	2, 038, 392	2, 278, 276	435, 774	503, 073	4, 958, 412	3, 907, 513
Herkimer	8, 208, 796	9, 548, 009	9, 068, 519	10, 901, 522	3, 526, 268	5, 101, 654	12, 364, 012	10, 978, 680
Jefferson	2, 802, 314	4, 192, 719	2, 819, 459	4, 773, 109	3, 357, 546	2, 545, 654	12, 081, 638	9, 962, 527
Lewis	....	3, 067, 300	1, 896, 741	2, 911, 775	3, 171, 721	977, 547	8, 694, 944	8, 353, 399
Madison	....	....	2, 087, 594	2, 589, 992	3, 462, 057	280, 776	4, 833, 000	4, 865, 434
Oneida	3, 277, 750	5, 218, 734	3, 311, 114	3, 519, 732	8, 107, 018	1, 228, 459	13, 067, 442	11, 794, 297
Oswego	....	1, 340, 545	975, 461	1, 108, 456	1, 460, 182	1, 089, 228	7, 034, 709	6, 613, 974
Otsego	....	2, 049, 673	1, 638, 493	2, 161, 929	1, 559, 591	829, 439	7, 094, 850	6, 109, 465
St. Lawrence	1, 281, 972	1, 596, 450	1, 672, 999	2, 353, 887	322, 615	1, 710, 082	14, 730, 278	11, 502, 880
Wyoming	....	1, 007, 359	823, 105	981, 946	446, 011	709, 935	5, 148, 340	3, 605, 072

NOTES.—The figures for 1865 represent only the cheese made in factories.

The figures for 1870 represent only the cheese made in private dairies.

According to the latest statistics these counties rank in the following order in regard to production: 1, Oneida; 2, St. Lawrence; 3, Cattaraugus; 4, Herkimer; 5, Jefferson; 6, Lewis; 7, Allegany; 8, Oswego; 9, Otsego; 10, Chenango; 11, Madison; 12, Erie; 13, Wyoming; 14, Chautauqua.

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